Translate
7T research power into clinical care
MAGNETOM Terra

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MAGNETOM Terra – Translate 7T research power into clinical care

MAGNETOM Terra is designed to let you explore new territories in MRI by enabling powerful 7T research and enhancing clinical care. Uncover a whole new world of clinical insights with double SNR[1] for more precision. Our advanced ultra-high-field (UHF) technology will keep you at the cutting edge of MRI, to attract the brightest minds to your facility, sharpen your competitive edge and strengthen your reputation. It delivers a fertile platform for unlocking research capabilities, publishing new insights first, and setting the pace in diagnostic imaging. Welcome to an exclusive research community. Welcome to a whole new world in MRI.

Welcome to clinical 7T.

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MAGNETOM Terra – Translate 7T research power into clinical care

Unique Dual Mode functionality[2]

- Uncover a whole new world of clinical knowledge with the flexibility to get more from your scanner
- Secure switch between research and clinical operation in less than 7 minutes
- Operating with 2 separate databases for clear research and clinical distinction[2]

80/200 gradients, 16-channel pTX[2] and up to 64 channels[3]

- More power for greater diffusion MRI and functional MRI with 80/200 gradients
- Higher homogeneity for challenging body regions with up to 16-channel parallel transmit (in research mode)[2]
- Higher acceleration factors with 64 receive channels[4]

50% lighter 7T magnet technology[5]

- Released for clinical use in Europe and the U.S.
- Lower weight and cold-shipment for easier integration in clinical environments[5]
- Reduced operating costs thanks to Zero Helium boil-off[6]

Double SNR for more precision[1]

- 0.2 mm in-plane resolution to visualize previously unseen structures[7]
- 0.14 cm^3 voxel sizes for metabolic brain mapping[8] (in research mode)[2]
- Submillimeter BOLD fMRI precision to visualize sub-cortical activations[9]

Explore metabolism

- ^{23}Na MRI and ^{31}P MRS for metabolic insights in clinical mode[10]
- Dedicated ^{23}Na head coil and ^{31}P loop coil
- Broadband RFPA enabling X-nuclei MR with up to 10 nuclei in research mode[2]

> 75% global market share in 7T technology

- Over 75% of 7T and 100% of vendor-integrated > 7T MRI human scanners worldwide from Siemens
- 7 of 11 leading U.S. hospitals with a 7T, (2018–2019), trust Siemens when they decide for 7T investment[11]
- 73% of ISMRM UHF abstracts in 2018 were based on data from Siemens UHF systems[12]

The world's largest UHF community

- Largest installed base for exchanging ideas in a strong collaborative network
- An opportunity to enhance your reputation and competitiveness
- Incentive for the brightest minds in the MRI community to work with you

Uncover a whole new world of clinical insights

Discovering new ground in MRI can help you significantly enhance patient outcomes. Imaging at 7T offers more than double the SNR of 3T. This delivers potential for better lesion conspicuity, faster image acquisition to reduce motion artefacts, and earlier disease detection at submillimeter resolution. MAGNETOM Terra is released for clinical use within Europe and the US. Its Dual Mode lets you switch between clinical and research tasks, unlocking new opportunities and providing a solid, well-founded platform for innovative results.

"Based on higher resolution, 7T provides new insights into gray and white matter disease in the brain, such as multiple sclerosis, focal cortical dysplasia, and hippocampal sclerosis. Furthermore, functional MR benefits from 7T based on a clinically relevant increase in functional sensitivity and specificity. In musculoskeletal imaging, 7T enhances the visualization of small joint structures and subtle pathologies, such as small meniscal tears, triangular fibrocartilage lesions, and early stages of cartilage degeneration."[13]

Professor Siegfried Trattnig
Director of the MR Centre of Excellence,
MedUni Wien, Vienna, Austria

Uncover a whole new world of clinical insights – Double SNR[1] for more precision with clinical applications in Dual Mode

Dual Mode flexibility[2]

MAGNETOM Terra is the first 7T scanner released for clinical use within Europe and the US. With the release for selected neurological and musculoskeletal scan protocols, it has potential to uncover a whole new world of clinical care. Its unique Dual Mode functionality lets you switch between research and clinical operation, giving you flexibility to get more from your scanner.

Ultra-fine anatomical resolution

In brain and musculoskeletal MRI, 7T reveals details previously unseen at lower field strengths. For example, cerebral cortex imaging at 0.2 mm in-plane resolution[7] may detect changes in cortical structure indicating early dementia. It also helps visualize cortical microinfarcts and plaques in MS patients and delivers insight into the plaque-vessel relationship and iron accumulation.

Submillimeter fMRI[9]

The BOLD contrast increases linearly with field strength. In clinical use, this could mean higher precision in oncology compared to 3T applications, for example, through smaller voxel sizes. Potentially, this can increase the accuracy of neurological pre-surgical evaluation of eloquent areas before tumor removal, while keeping scanning times viable[14].

Powerful image reconstruction

MAGNETOM Terra delivers improvements in workflow for easier operation and better patient handling. Leveraging the latest *syngo* MR E12 software platform, it lets you work in the same way as you do with cutting-edge 3T technology. What's more, it comes with the most powerful MaRS (Measurement and Reconstruction System) computing technology ever built.[5]

Physiology is at your fingertips

MAGNETOM Terra is the first 7T MRI scanner to unleash the full potential of the increased MR signal with multinuclear imaging and spectroscopy in clinical settings. The multinuclear option allows the use of two dedicated coils – a ^{23}Na head coil and a ^{31}P loop coil, to explore metabolic insights[10].

Switch between research and clinical tasks with **Dual Mode**[2]

Ultra-fine resolution to visualize details previously unseen

Explore physiology with **multinuclear MR**[10]

Ultra-fast image reconstruction[5] and ***syngo*** **MR E12**

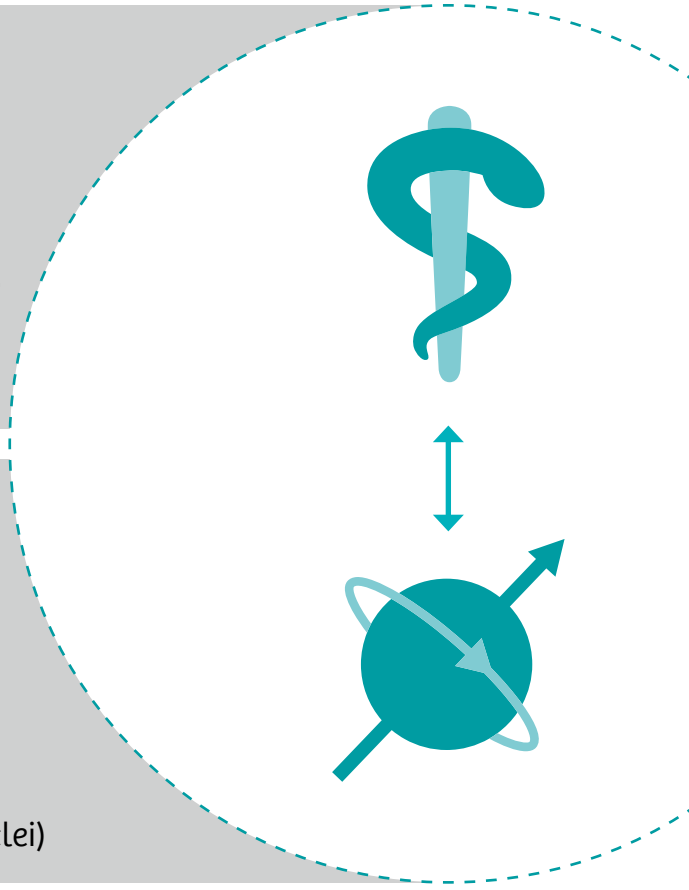
Dual Mode[2] offers the flexibility to switch from research to clinical tasks

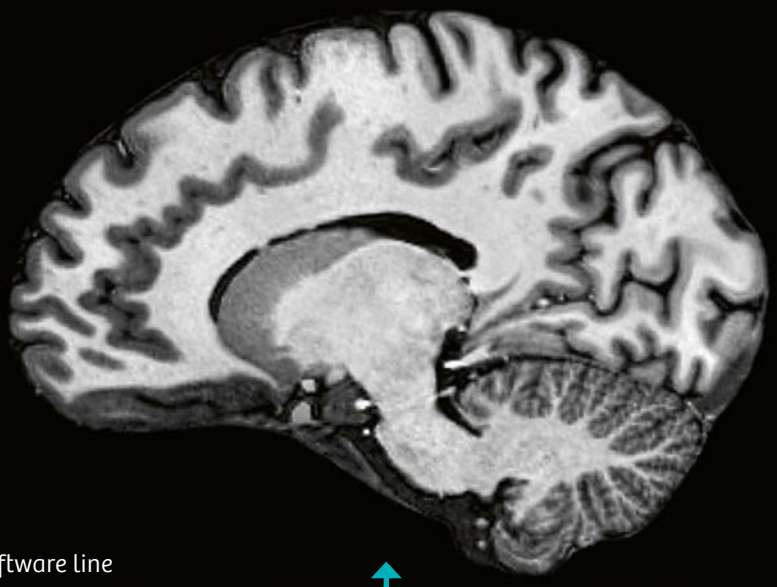
Clinical Mode

- 1 transmit channel
- 11 kW RF power
- 2 ^{1}H coils (Head 32, Knee 28)
- 2 MNO coils (^{23}Na Head 32, ^{31}P Flex Loop)
- Neuro and MSK optimized clinical applications

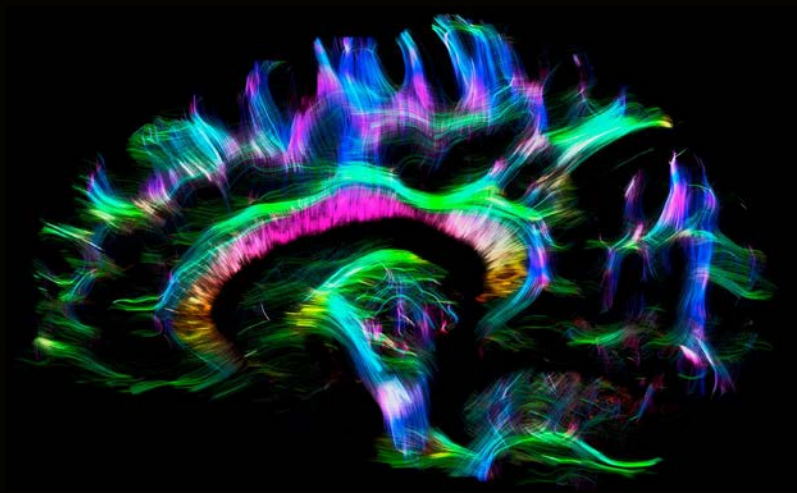
Research Mode

- single channel and up to 16-channel parallel transmit
- 16 x 2 kW RF power
- Wider range of RF coils
- Whole-Body WIP Applications
- Broadband RFPA for X-nuclei MR (10 nuclei)





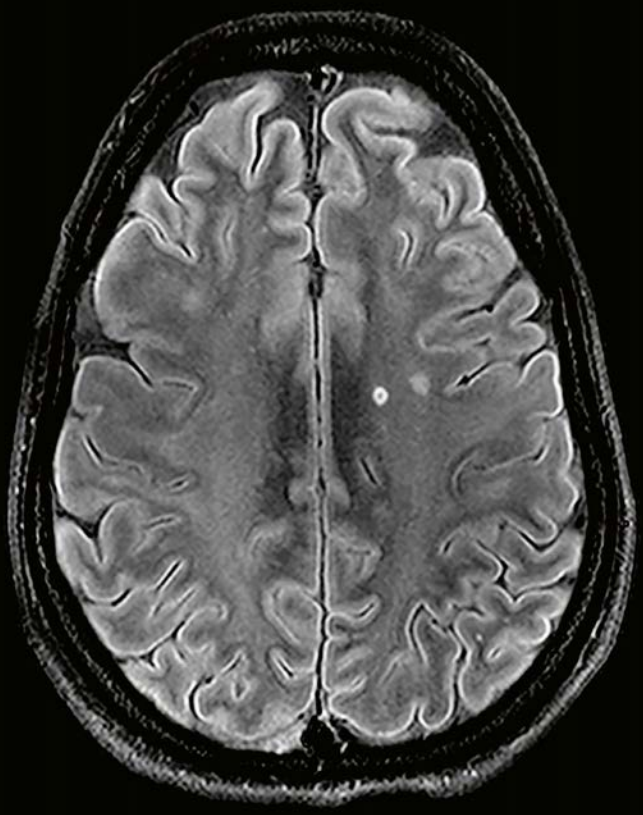
- *syngo* MR E12 software line
- XR Gradients 80/200
- Up to 64 receive channels
- Latest MaRS computer
- 3rd order shims



Max Planck Institute, Leipzig, Germany

Clinical Mode – Multiple Sclerosis

Hyperintense MS lesion with hypointense center



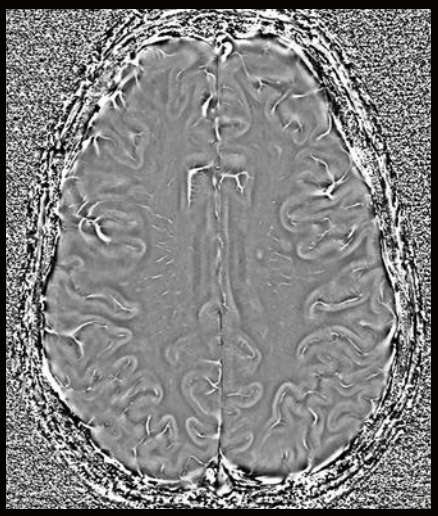
DarkFluid TSE

0.3 x 0.3 x 3 mm³,
5:59 min

SWI minIP/phase

0.2 x 0.2 x 1.2 mm³,
5:38 min

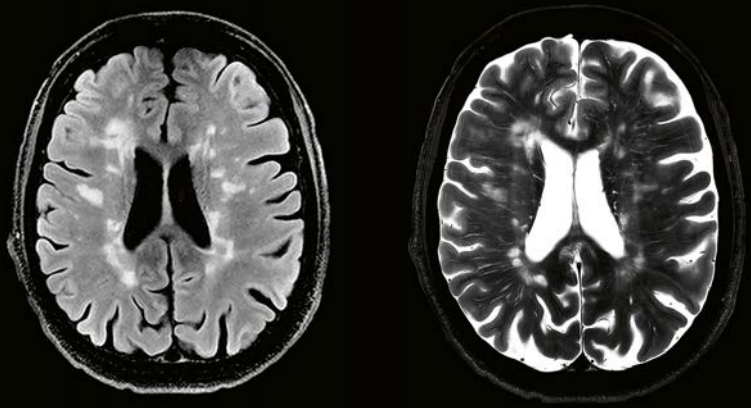
Typical central vein and perivenular demyelination is visible.



FAU, Erlangen, Germany

Multiple Sclerosis
with low lesion load

Multiple Sclerosis
with high lesion load



Dark Fluid TSE

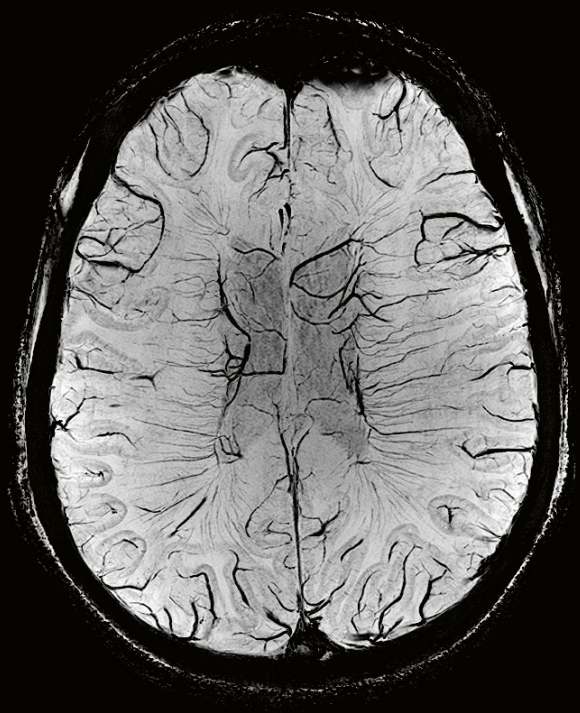
0.3 x 0.3 x 3 mm^3, 5:20 min

T2 TSE

0.2 x 0.2 x 3 mm^3, 5:33 min

SWI

0.2 x 0.2 x 1.2 mm^3,
5:38 min



FAU, Erlangen, Germany

Clinical Mode – Tumor

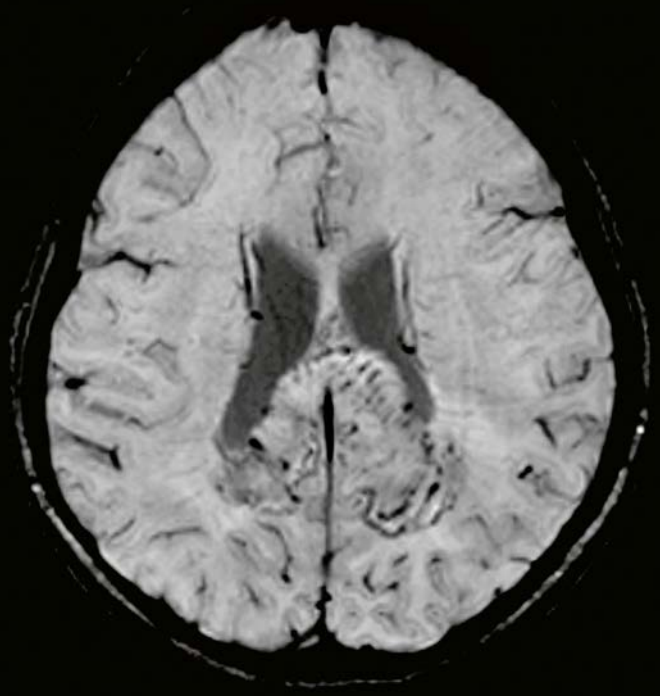
3D SWI of Glioblastoma

3D SWI minIP provides superior assessment of the microvasculature.

Erwin L. Hahn Institute for MRI, Essen, Germany

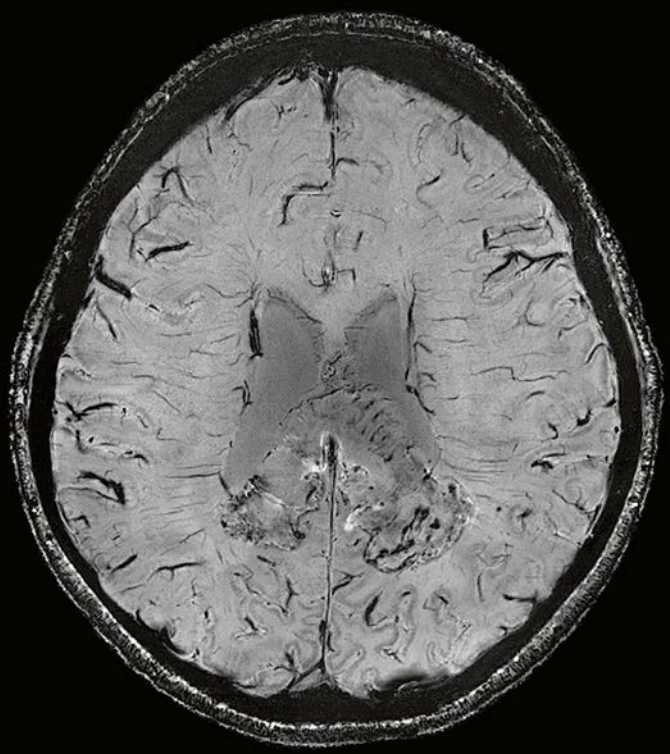
3 Tesla

0.85 x 0.72 x 2 mm^3



7 Tesla

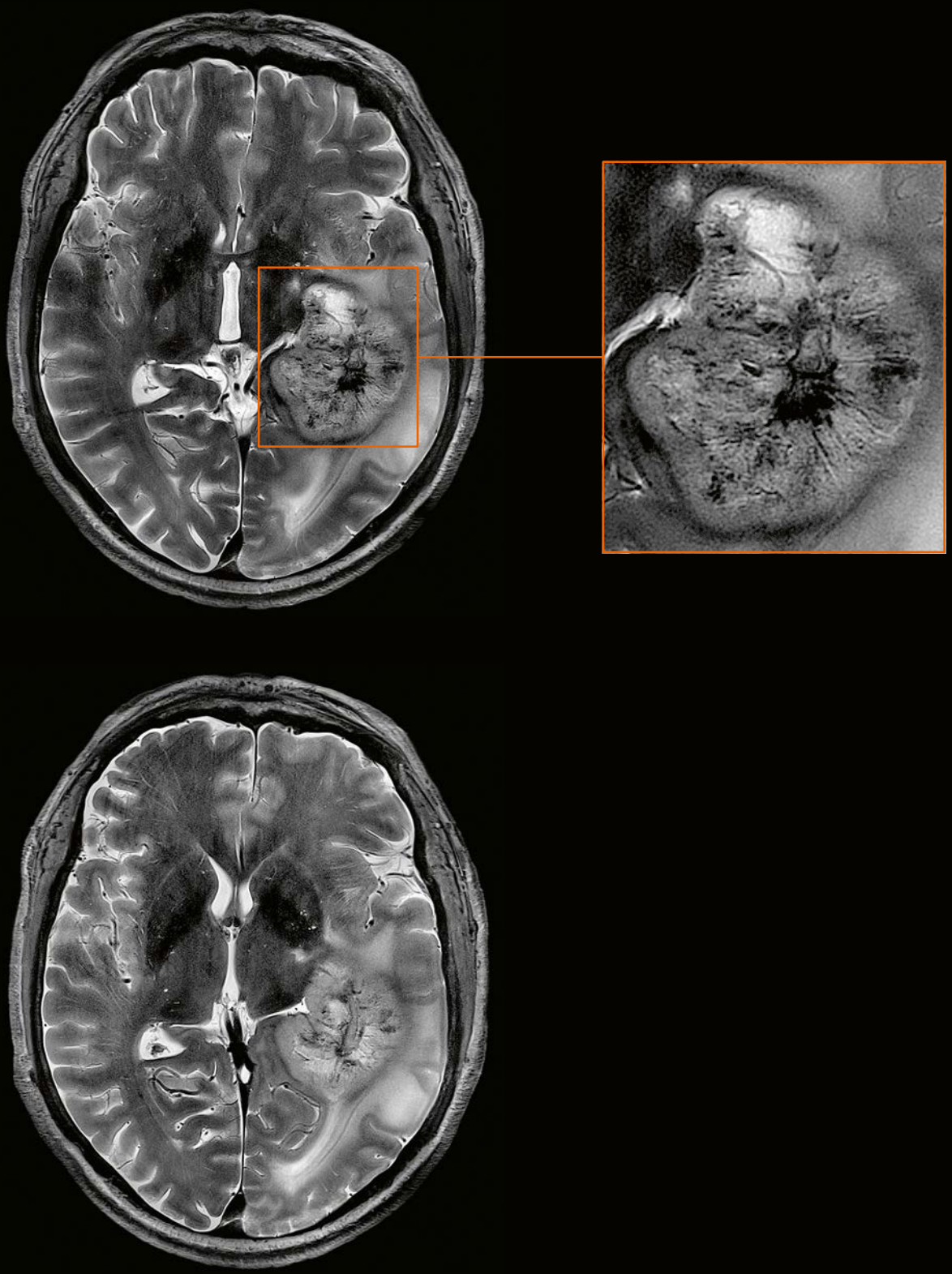
0.25 x 0.25 x 1 mm^3



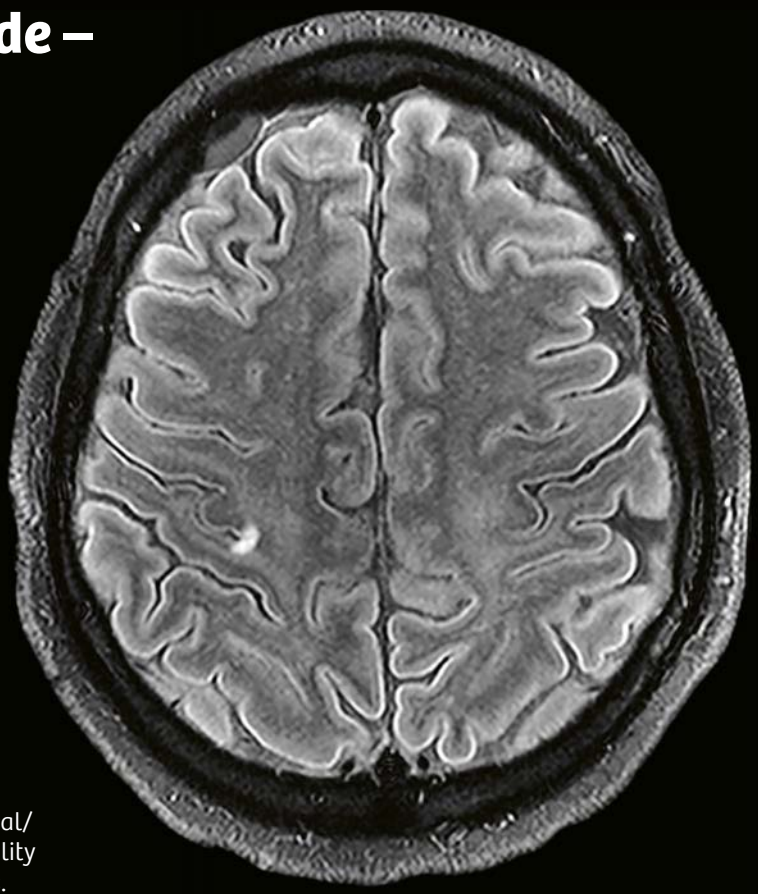
Glioblastoma

Higher SNR for ultra-high 0.2 mm in-plane resolution for imaging tumor vascularization.

DKFZ, Heidelberg, Germany



Clinical Mode – Stroke

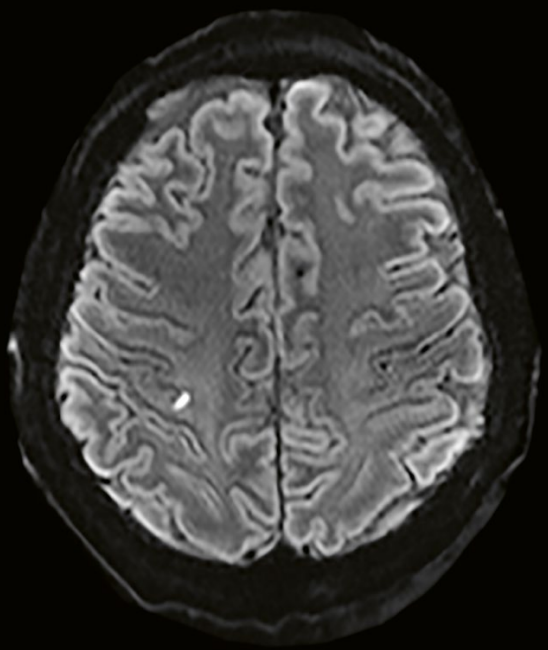


DarkFluid TSE

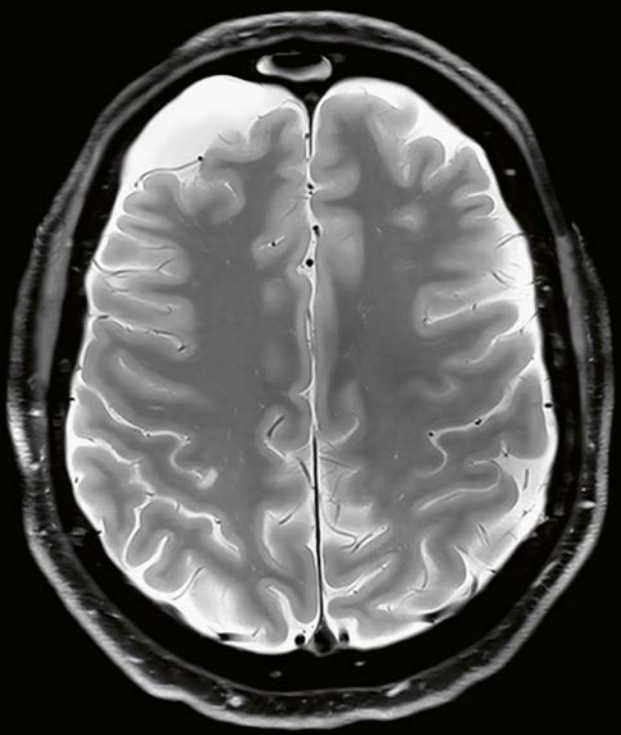
0.3 x 0.3 x 3 mm^3, 5:59 min

Small focus of strong cortical/ subcortical signal abnormality in the right precentral gyrus.

FAU, Erlangen, Germany

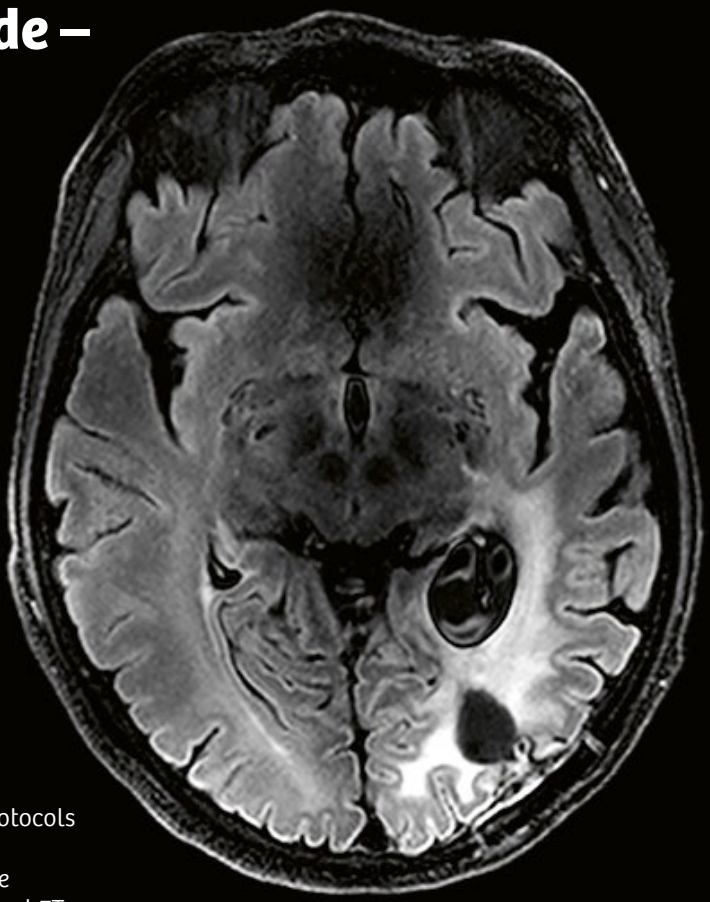


RESOLVE 1 x 1 x 3 mm^3, 1:46 min



PD FS TSE 0.2 x 0.2 x 3 mm^3, 5:14 min

Clinical Mode – Tumor



DarkFluid TSE

0.4 x 0.4 x 3 mm^3, 4:22 min

High resolution standard protocols for detailed visualisation of pathologies, increased tissue contrast and high resolution at 7T.

FAU, Erlangen, Germany

SWI minIP 0.2 x 0.2 x 3 mm^3, 5:38 min

T2 TSE 0.2 x 0.2 x 3 mm^3, 5:33 min

Clinical Mode – Healthy volunteer

Hippocampus imaging

High-resolution imaging of the hippocampus at 0.25 mm in-plane resolution.

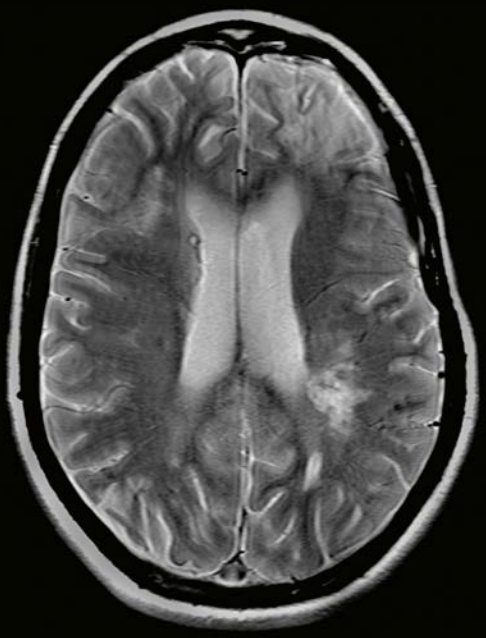
Scannexus, Maastricht, Netherlands

T2* weighted imaging

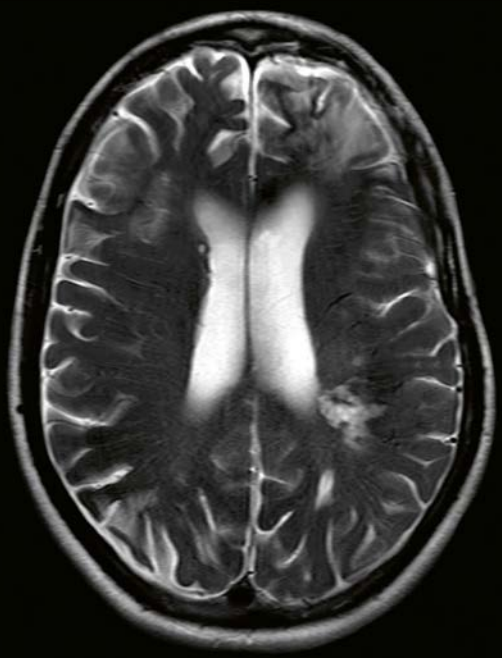
High-resolution imaging of the brainstem at 0.3 mm in-plane resolution.

MGH, Boston, USA

Clinical Mode – Diffuse axonal injury



3 Tesla PD TSE, 0.7 x 0.4 x 5 mm^3, TA 2:38 min



3 Tesla T2 TSE, 0.7 x 0.4 x 5 mm^3, TA 2:38 min

7 Tesla PD PD TSE, 0.2 x 0.5 x 3 mm^3 , TA 3:09 min

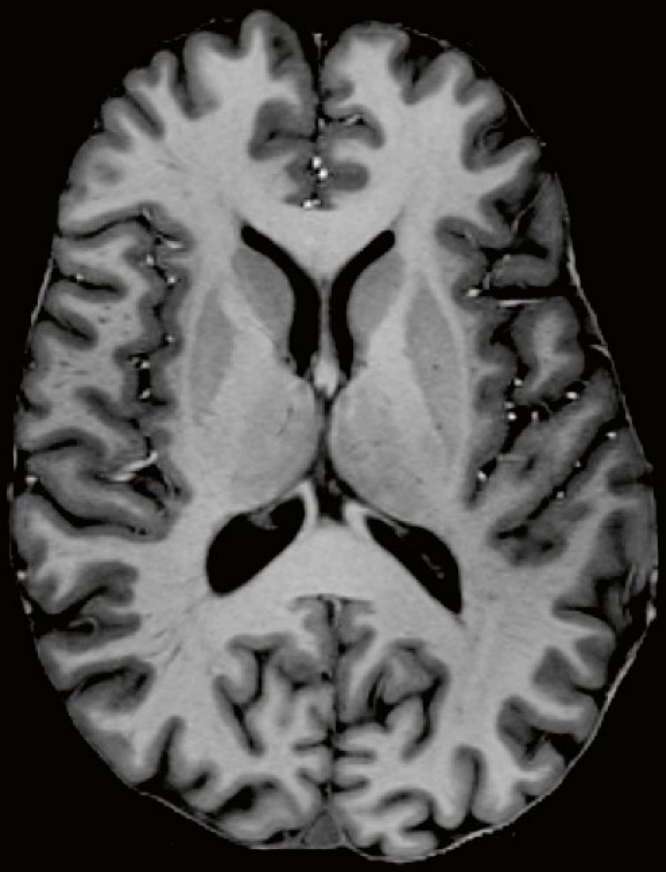
7 Tesla T2 TSE, 0.2 x 0.5 x 3 mm^3 , TA 3:09 min

Diffuse axonal injury

The higher sensitivity at 7T reveals hemosiderin from traumatic brain injury in PD images.

Erwin L. Hahn Institute for MRI, Essen, Germany

Clinical Mode – Healthy volunteer



Clear identification of anatomical structures with increased tissue contrast and high resolution at 7T.

0.6 x 0.6 x 0.6 mm^3, 13:45 min

FAU, Erlangen, Germany

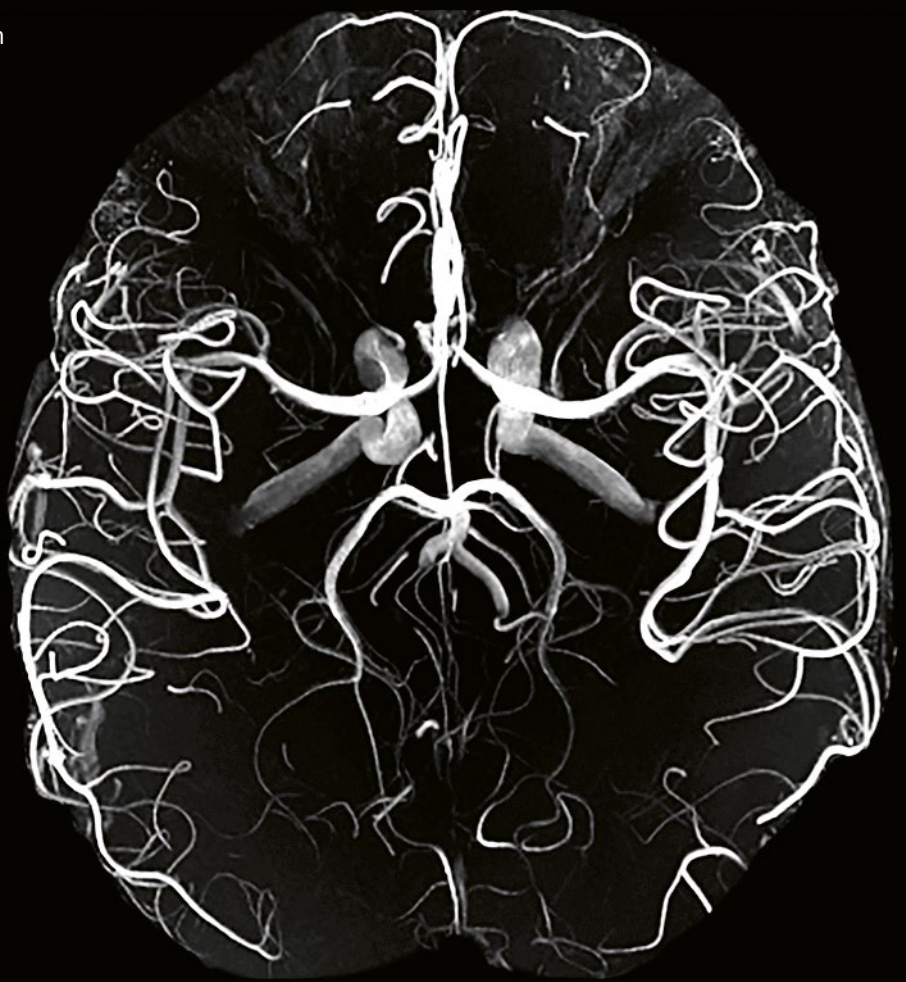
Clinical Mode – Stroke

Time of Flight (ToF) with 400 micron isotropic resolution reveals smallest vessels in the brain. The higher the signal and the longer the T1 at 7T are, the higher the quality of the Maximum Intensity Projection (MIP) gets.

Coronal

Sagittal

Axial



Visualize smallest vessels with 0.4 mm isotropic resolution.

0.4 x 0.4 x 0.4 mm^3, 8:09 min

FAU, Erlangen, Germany

Clinical Mode – Healthy volunteer

0.2 mm in plane resolution

The basal ganglia Caudate, Putamen and Globus Pallidus can be differentiated.
Enlarged sections: cortical veins can be depicted.

SWI 0.2 x 0.2 x 1 mm^3, 10:59 min

FAU, Erlangen, Germany

Clinical Mode – Enchondroma

Fine structure visible in the lesion with different contrasts.

PD TSE FS 0.2 x 0.2 x 2.5 mm^3, 3:15 min

T2 TSE 0.3 x 0.3 x 2 mm^3, 3:24 min

3D DESS 0.5 x 0.5 x 0.5 mm^3, 3:43 min

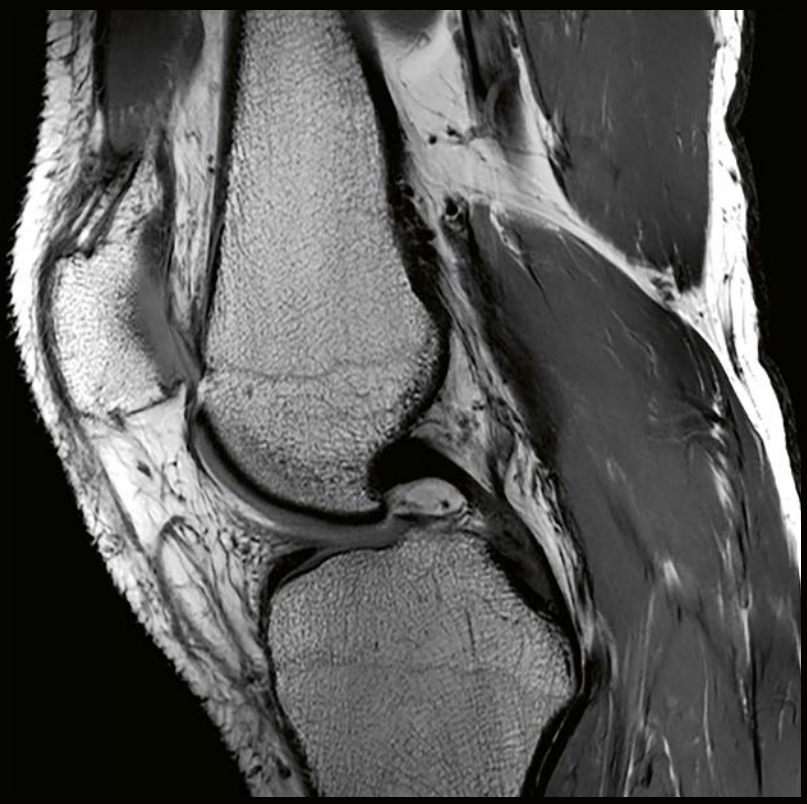
FAU, Erlangen, Germany

Clinical Mode – Healthy volunteer

Clear delimitation of anatomical structures, such as ligaments, vessels or cartilage.

T1 SE

0.2 x 0.2 x 2.5 mm^3,
4:05 min



T1 qSE

0.3 x 0.3 x 2.5 mm^3,
7:21 min

FAU, Erlangen, Germany

Clinical Mode – Healthy volunteer

PD qTSE FS

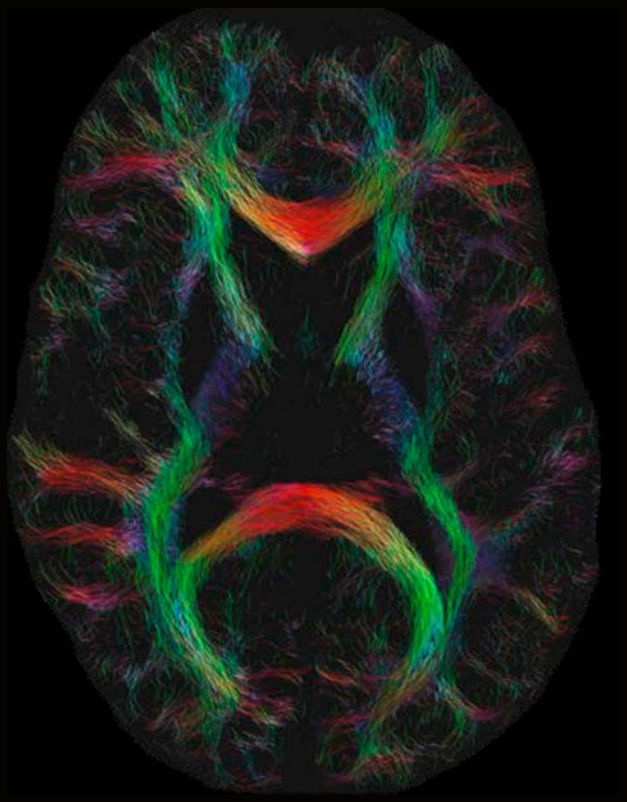
0.2 x 0.2 x 2.5 mm^3,
3:15 min

T1 FL3D WE

0.5 x 0.5 x 0.5 mm^3,
4:35 min

FAU, Erlangen, Germany

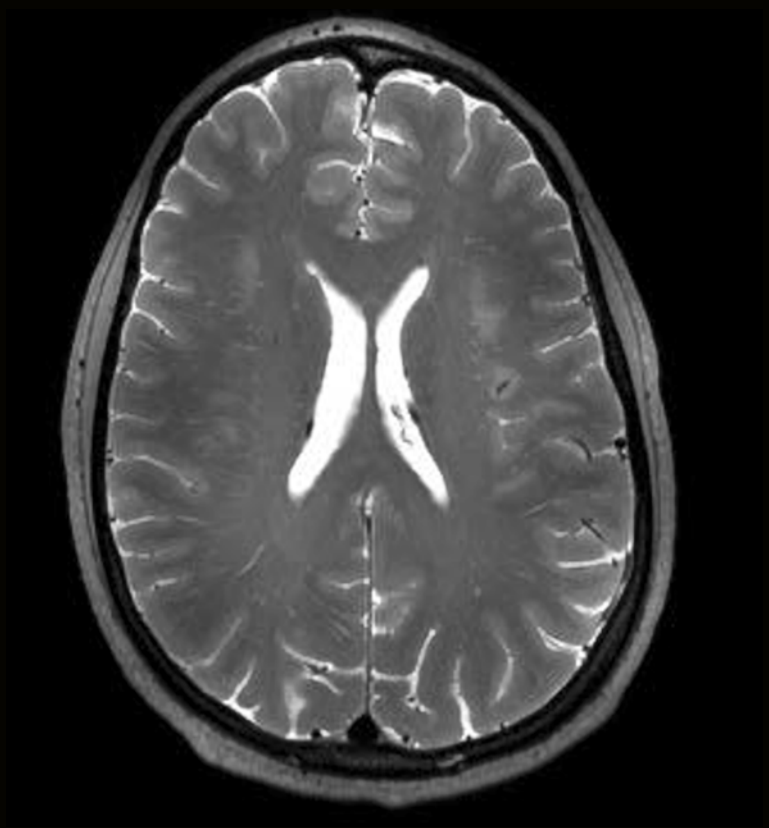
Clinical Mode – Healthy volunteer



High resolution fiber tracking with SMS RESOLVE at 7T and *syngo*.via Frontier[15]

1.4 mm isotropic, 29:22 min

FAU, Erlangen, Germany

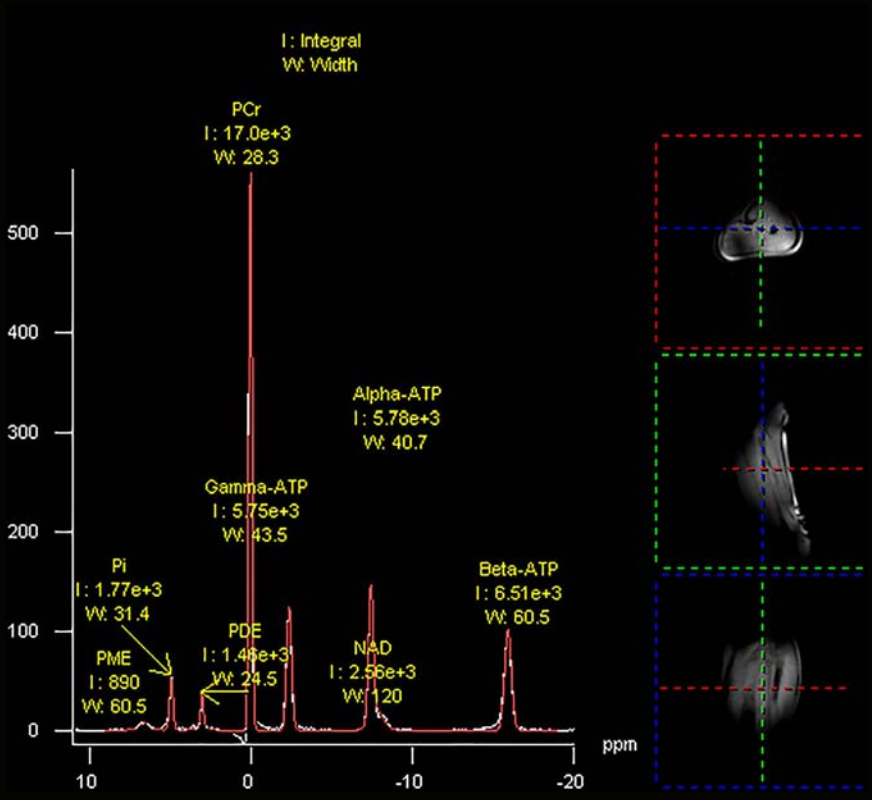


CAIPIRINHA acceleration for the SPACE pulse sequence at 7T, acceleration: 3x2

0.7 mm isotropic, 6:52 min

FAU, Erlangen, Germany

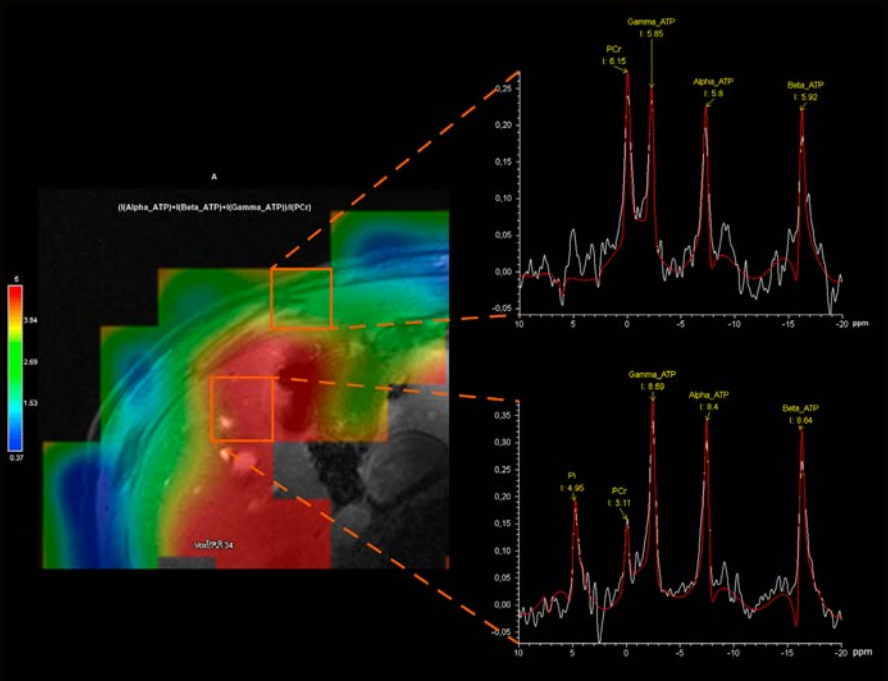
Clinical Mode – Healthy volunteer



^{31}P FID of the human calf with NOE enhancement

Non slelctive 1:42 min

FAU, Erlangen, Germany



^{31}P CSI of the human liver

15 ml voxel volume, 4:42 min

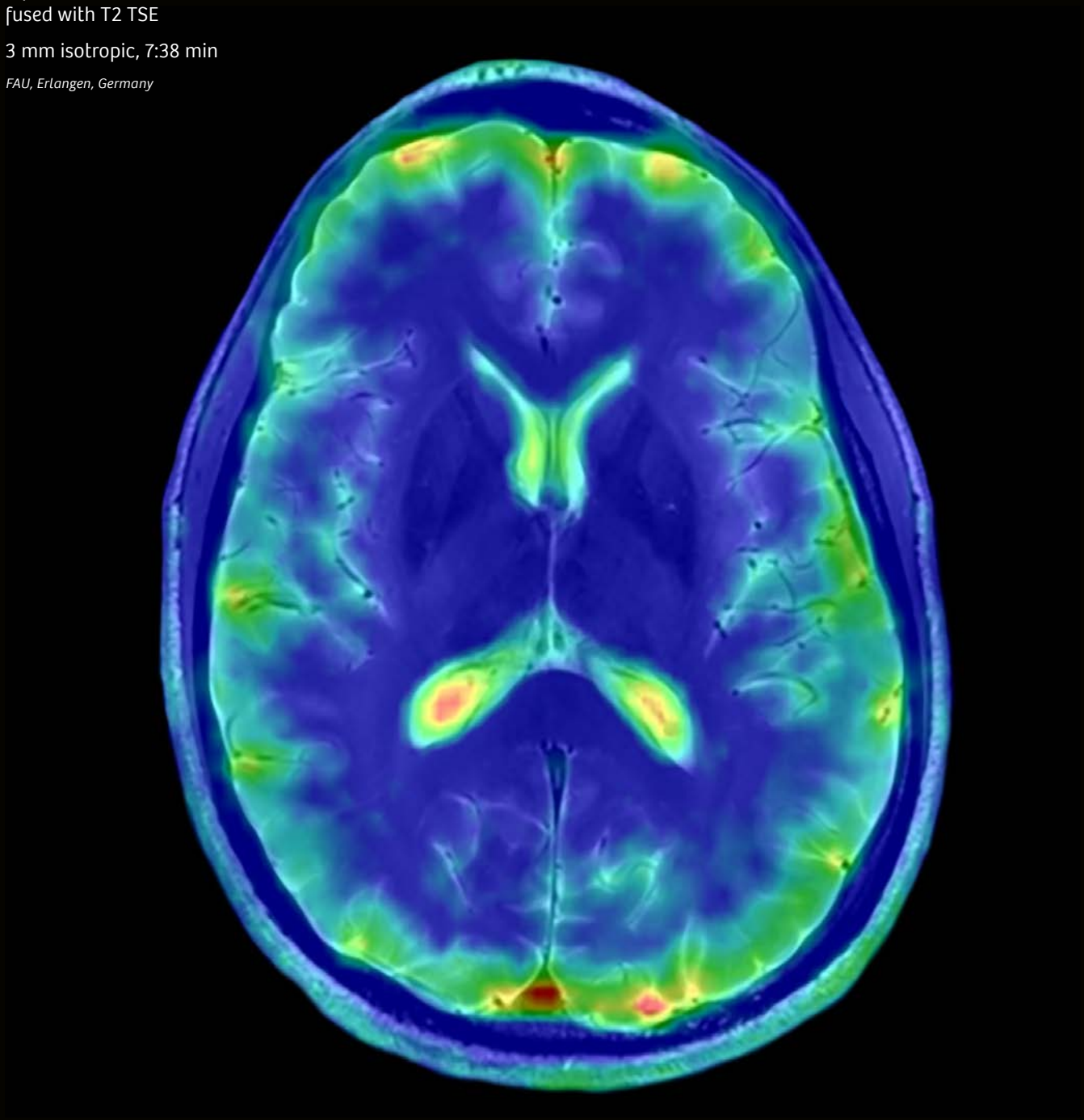
FAU, Erlangen, Germany

Clinical Mode – Healthy volunteer

Additional metabolic information with ^{23}Na UTE, fused with T2 TSE

3 mm isotropic, 7:38 min

FAU, Erlangen, Germany

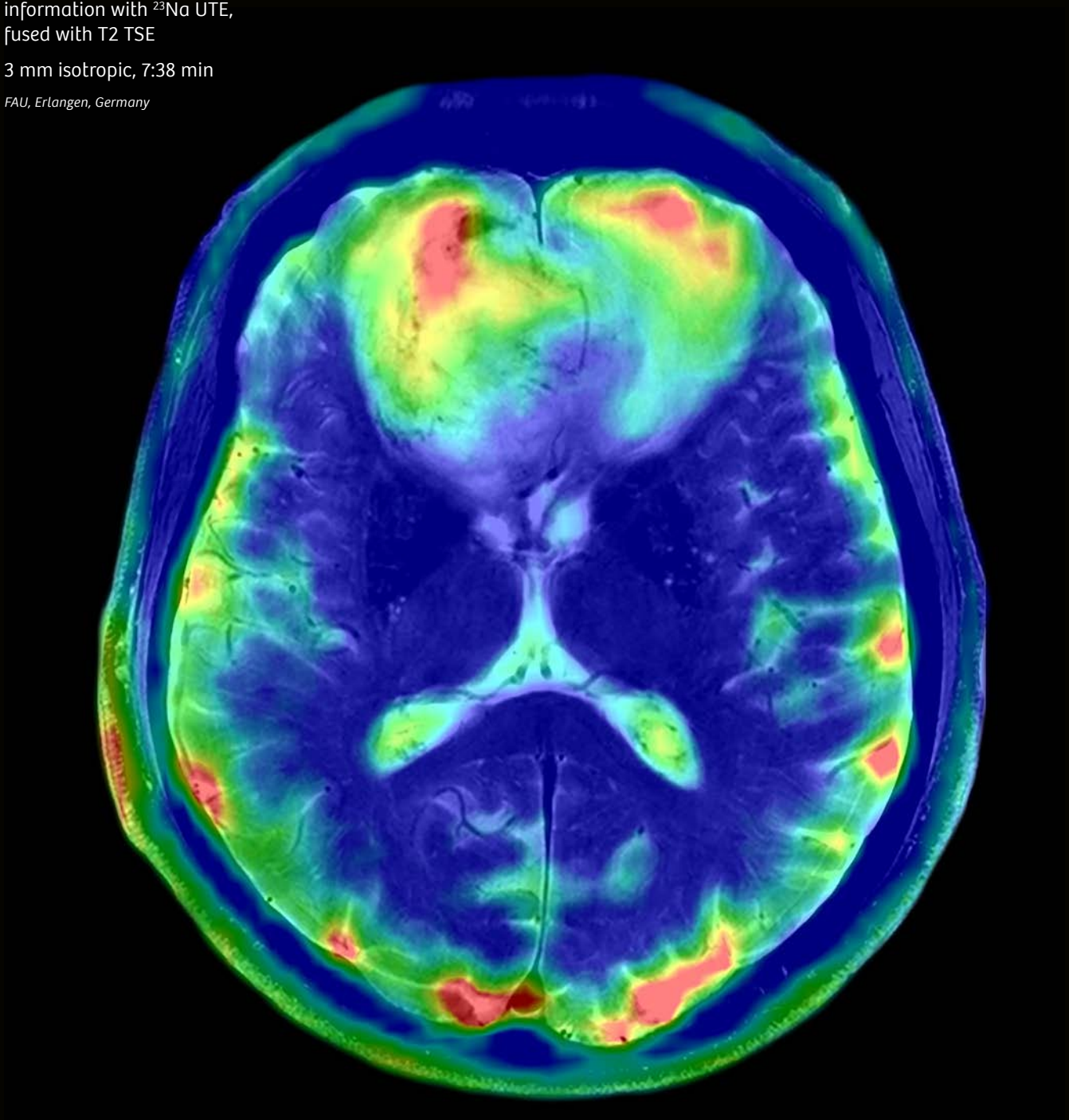


Clinical Mode – Tumor

Additional metabolic information with ^{23}Na UTE, fused with T2 TSE

3 mm isotropic, 7:38 min

FAU, Erlangen, Germany



Change the game in UHF business

Medical research funding has stagnated in the last decade. Ensuring your high-end MRI endeavors have the right business impact is crucial in today's competitive environment. MAGNETOM Terra is the result of over 25 years of Siemens UHF innovations, culminating in the design of a brand-new, volume-produced 7T magnet. The magnet is 50% lighter than previous generations and supports easier integration into clinical environments. MAGNETOM Terra can help you become more competitive, while making a tangible difference to clinical care, research – and your business.

"When you talk to other people in the field, it is clear that Siemens has by far the greatest expertise in ultra-high-field imaging."[13]

Professor Rainer Goebel
University of Maastricht & scannexus,
Maastricht, The Netherlands

Change the game in UHF business with Siemens Healthineers' 50% lighter 7T magnet[5]

Innovative magnet technology

Siemens Healthineers' 7T magnet is a milestone in MR magnet technology. Its unique design and thermally balanced materials minimize physical interactions between core components. The result is 50% lighter than previous generations, with a higher structural stability and a greater fundamental stress capacity. In addition, excellent homogeneity makes for enhanced image quality.

Easy clinical integration

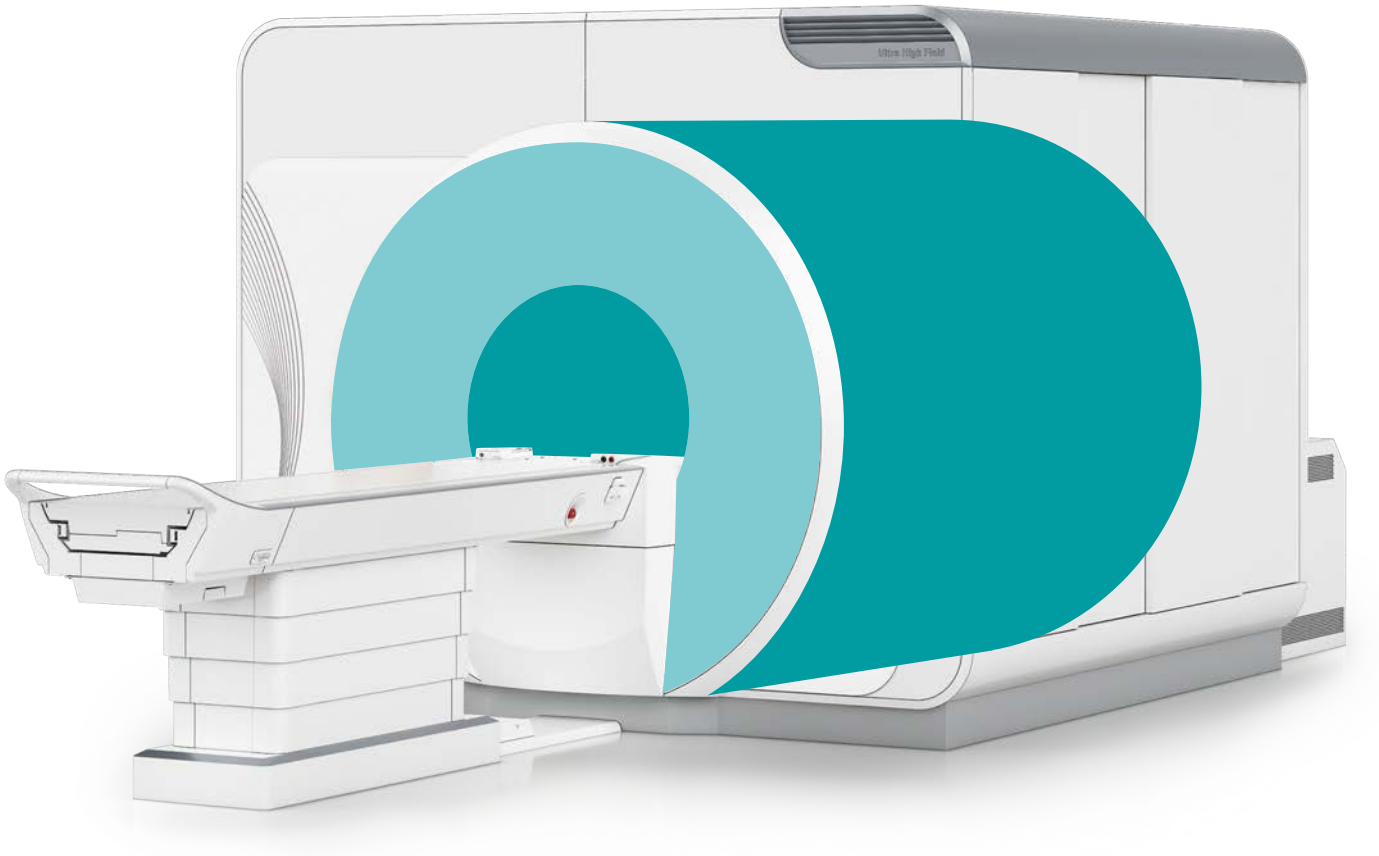
Thanks to the lighter magnet, the scanner can be shipped cold via airfreight. What's more, you benefit from up to 50% faster installation time and ramp-up. Zero Helium boil-off[6] translates into lower lifecycle costs and an improved eco-footprint. All this has the potential to enhance performance, lower resource consumption, improve sustainability, and reduce operating costs.

Increased competitiveness

MAGNETOM Terra[8] can help you broaden research funding opportunities, making your institution stand out as a leader in life sciences. By being at the cutting edge of clinical care and research, you have the opportunity to increase competitiveness for grants, benefit from reduced complexity in clinical trials, and open up potential for clinical imaging reimbursements.

Forward-looking technology

An investment in MAGNETOM Terra is an investment in the future. Siemens is committed to serving the ultra-high-field community – today and tomorrow – with a host of outstanding innovations. From development and production, to service – all of MAGNETOM Terra's key components are delivered from a single reliable partner you can trust, for maximum peace of mind.



Released for clinical use in Europe and the U.S.

50% lighter magnet technology[5]

Lower weight and cold-shipment for easy integration

Zero Helium boil-off[6]

Proven innovations in the development and production of magnet technology

1980
The world's first superconducting whole-body MRI

1989
The world's first 1.5T active-shielded magnet

1994
The world's first open MRI magnet

1997
The world's first 3T active-shielded magnet

Award-winning development and production

Siemens Magnet Technology in Oxford, UK, has received seven Best Factory Awards and seven Queen's Awards for Enterprise in multiple categories, including for processes and design. The facility deploys leading-edge supply chain management methods, and prides itself on reliable, robust production and the highest standards of quality.

2003
The world's first Zero Helium boil-off magnet (MAGNETOM Avanto)

2004
The world's first open-bore (70 cm) 1.5T magnet (MAGNETOM Espree)

2008
The world's first open-bore (70cm) 3T magnet (MAGNETOM Verio)

2010
The world's first PET-compatible magnet (Biograph mMR)

Best Factory Awards for Siemens Magnet Technology, Oxford (Process and Design)

2012
Best Factory Awards for Siemens Magnet Technology, Oxford (Best Engineering Plant, Supply Chain Award & Innovation Award)

2015
The world's first cold-shipped 7T magnet, 50% lighter (MAGNETOM Terra)

BEST Factory Award overall winner

2017
First cold air shipped 7T magnet

April 2015 – Installation of Siemens' first 7T magnet

During the 30 years that we have been producing 1.5T and 3T magnets, we have gained extensive engineering skills and well-founded process expertise. This knowledge and experience has led to the development and production of our own 7T magnet.

Universitätsklinikum Erlangen, Germany

"We are extremely proud at Siemens Magnet Technology to have developed the 7T magnet at the heart of the MAGNETOM Terra. Once again our expert design and process teams have demonstrated how their innovative thinking has led to a product that has pushed forward the boundaries of magnet technology. It is wonderful to see how seamlessly the manufacture of this flagship product has already been integrated into our award winning facility."

Ralph Seidler
Managing Director,
Siemens Magnet Technology

Unlock research beyond clinical limits

When it comes to research, the freedom to push the boundaries is imperative for gaining a competitive edge. For neuroscience and clinical research applications, MAGNETOM Terra delivers ultra-high SNR and up to 16-channel pTX[2] for imaging challenging body regions. In addition, it has up to 64 receive channels[3] for higher acceleration factors[4] and 80/200 gradients for maximum flexibility, as well as a broadband RFPA for the multinuclear option. Moreover, this powerful, reliable scanner supports basic research by helping you develop groundbreaking technologies, set new trends and translate your outcomes into clinical routine.

"The increased spatial resolution offered by 7T MRI enables us to study fine-grained activation patterns within cortical areas and investigate detailed functional topography of the cerebral cortex in individual human subjects. This will provide us with a deeper understanding of the human brain and its connectomics in healthy and diseased populations."[13]

Professor Kamil Ugurbil
Director of the Center for Magnetic Resonance Research (CMRR), Minneapolis, Minnesota, USA

Unlock research beyond clinical limits with 16-channel parallel transmit²

Enhanced images with pTX²

Image quality and speed are key, but inhomogeneities may present challenges, for example, in body MRI. MAGNETOM Terra's pTX technology with up to 16 channels helps you overcome these issues and generate images of excellent quality. This particularly promising technology has the potential to support your own hardware developments.

More power for your research

MAGNETOM Terra offers a host of cutting-edge research functionalities, providing access to works in progress packages[2] and powerful hardware configurations. 80/200 gradients and up to 64 receive channels deliver enhanced capabilities for your studies. What's more, the scanner gives you the freedom to explore and develop new clinical applications only possible at ultra-high-field strengths.

Ultra-high resolution spectroscopy²

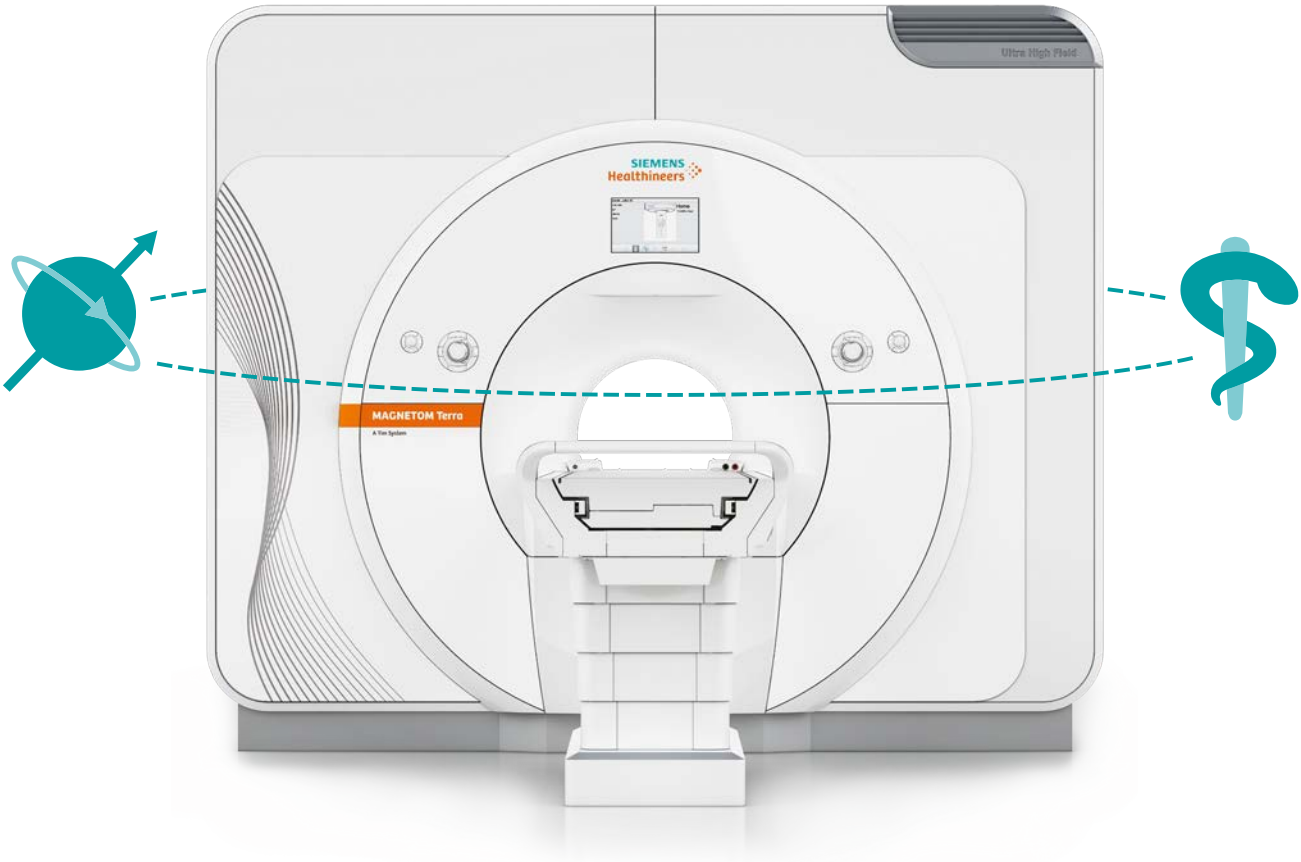
Proton magnetic resonance spectroscopy at 7T not only delivers metabolic information, but also gives accurate anatomical insight. Ultra-high 0.14 cm^3 resolution[8] has the potential to reveal valuable new diagnostic information for clinical applications – including patients with tumors, epilepsy, multiple sclerosis or other neurodegenerative diseases.

Open platform architecture²

MAGNETOM Terra provides a flexible, fertile ground for your own UHF hardware and software developments. For example, Siemens collaboration partners benefit from technical support and direct access to the sequence, the Image Calculation Environment (ICE), and imaging protocols.

Discover a world beyond anatomy

The broadband RFPA enables the acquisition of spectra and images with up to 10 nuclei². While ^{23}Na and ^{35}Cl imaging can give insights to salt balance, ^{31}P spectroscopy can shed a light on energy metabolism[10]. Use this additional layer of information to dive into a world of metabolic imaging with MAGNETOM Terra.



16-channel pTX for higher homogeneity[2]

80 / 200 gradients and 64 receive channels[3] for more research power

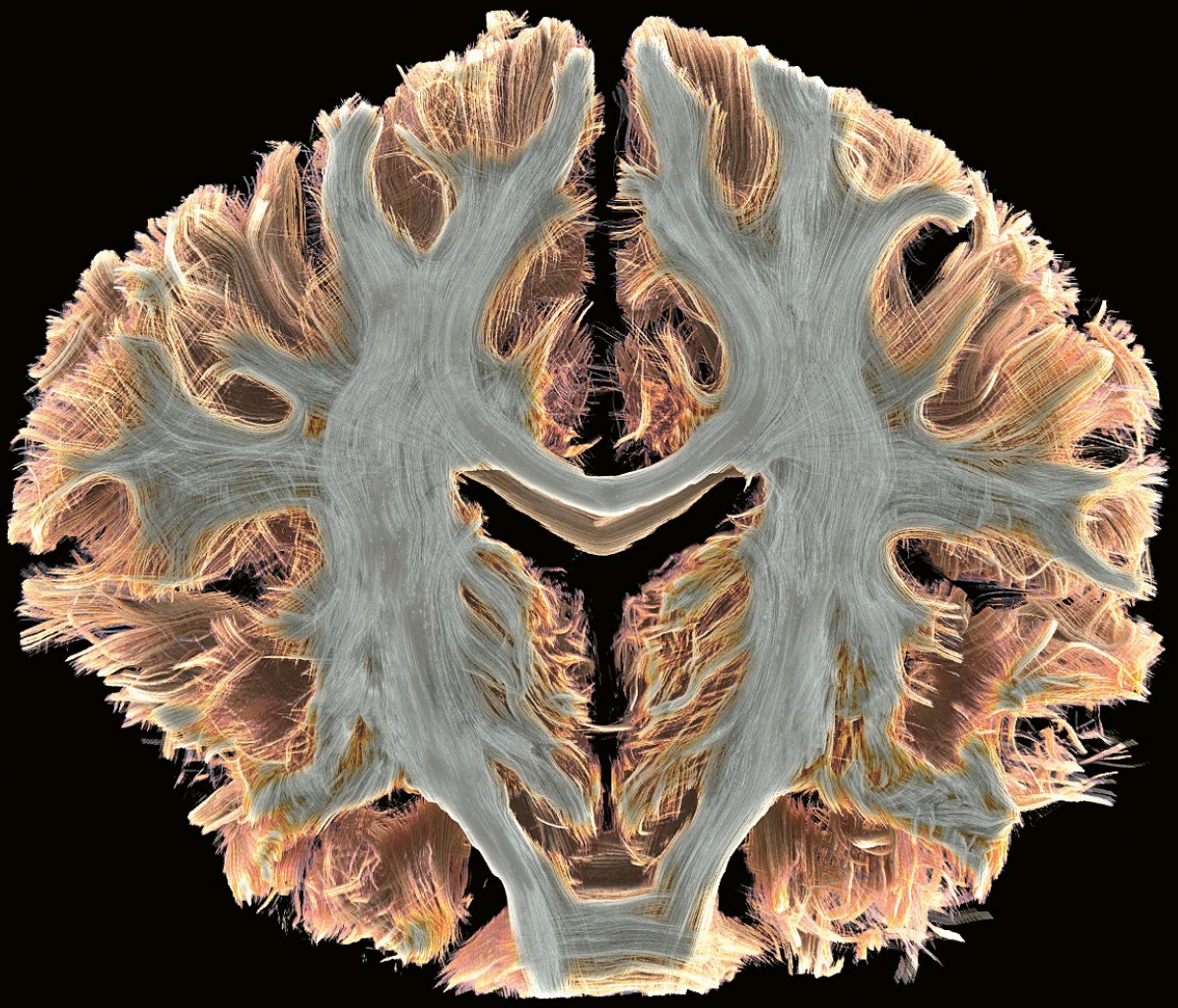
Open platform architecture for own developments[2]

Dive into Physiology with **X-nuclei MR** for up to 10 nuclei[2,10]

Transparent fibers

Tracks calculated with spherical deconvolution based on diffusion-weighted EPI acquisitions with 1 mm isotropic resolution covering the whole brain. The high SNR provided by 7T allows resolving crossing fibers in many brain sub-regions.

Max Planck Institute, Leipzig, Germany



In-vivo histology

syngo.via Frontier[15], the research extension of *syngo*.via, helps bridge the gap in post-processing translational research. Cinematic rendered images based on MR data sets may be used for patient counseling, surgery planning, or teaching purposes.[16]

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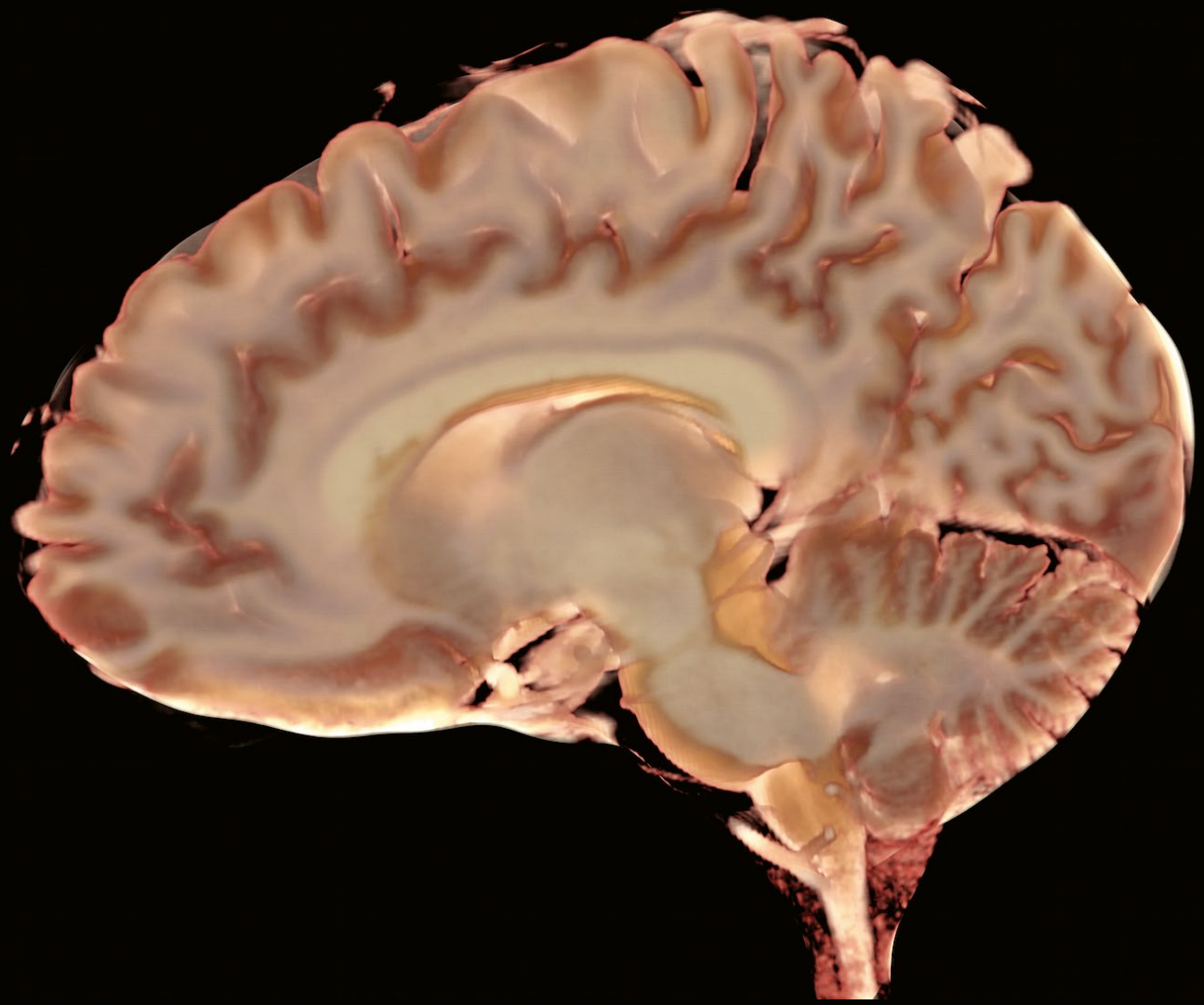

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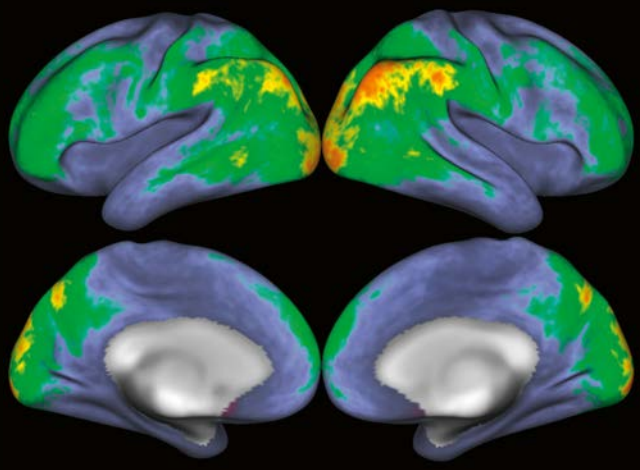
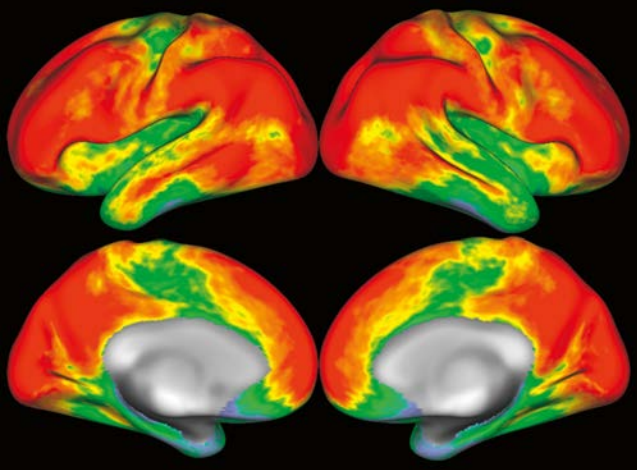


3 Tesla

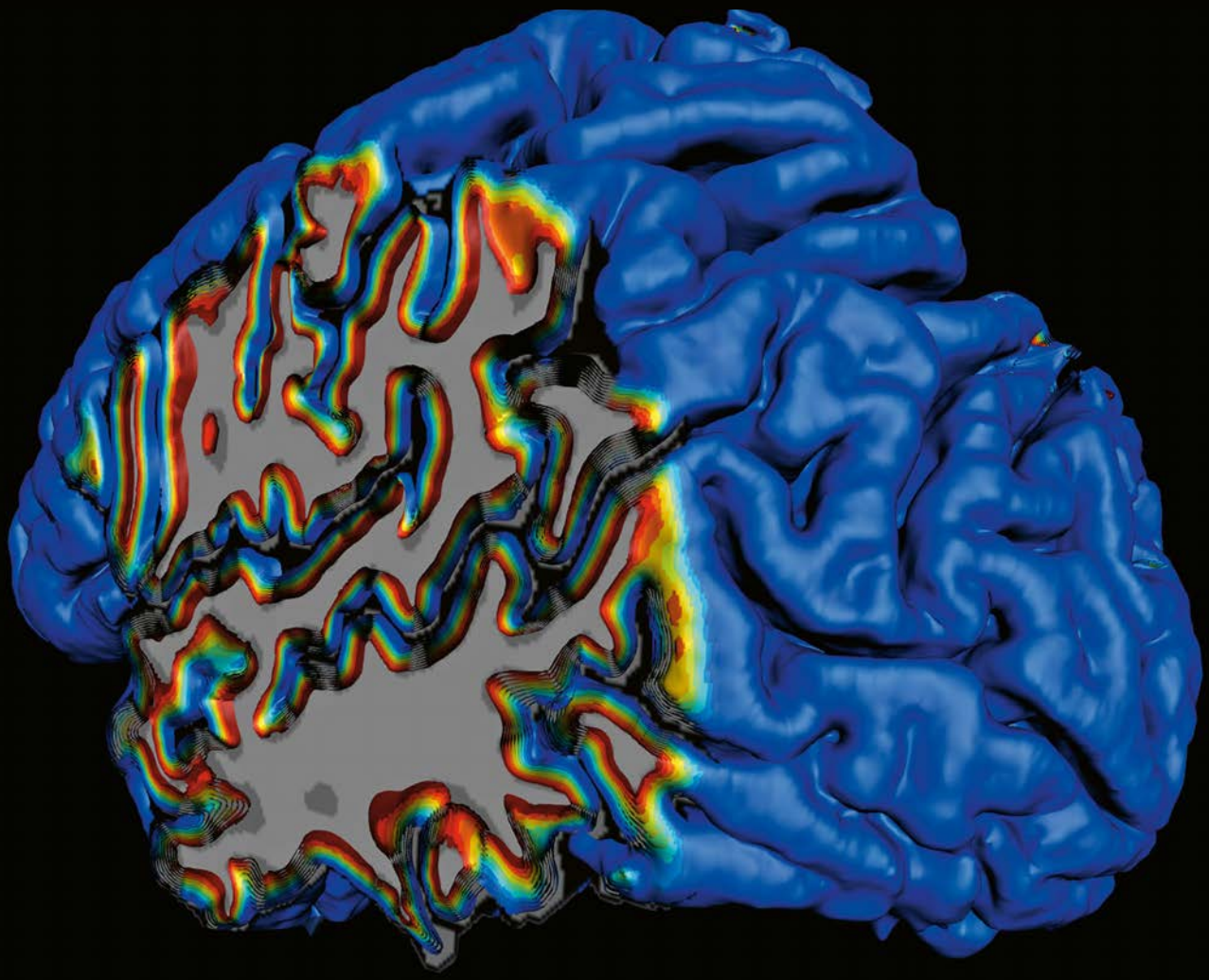


7 Tesla

Functional MRI

Contrast-to-noise ratio maps in resting state fMRI.

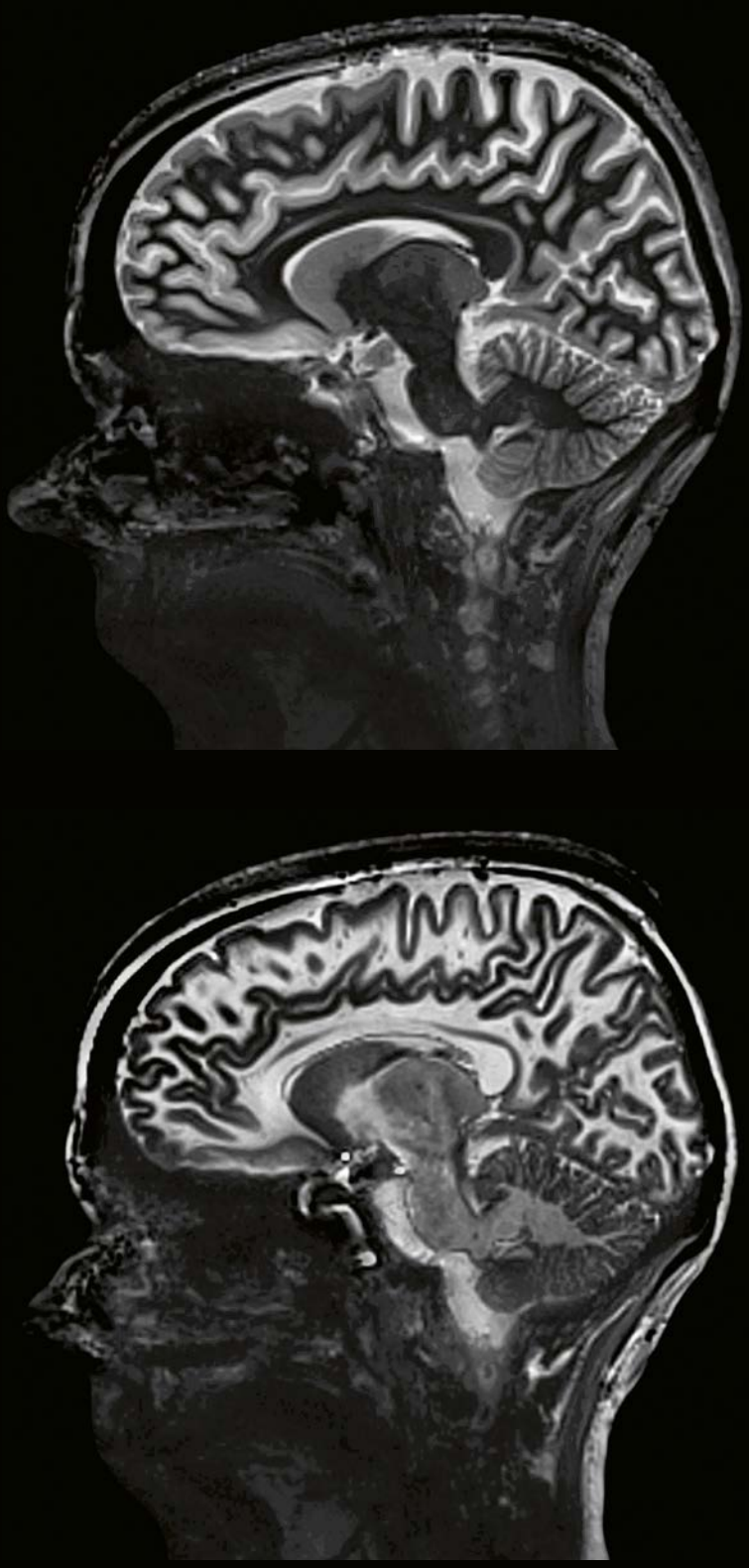
Consortium The Human Connectome Project.
CMRR, Minnesota, USA
Washington University St.Louis, USA
Oxford University, UK



Depiction of cortical layers

Post-processed high-resolution anatomical MR data reveals reconstructed surfaces at different cortical depth levels. The inner red surface runs along the white/gray matter boundary. The outer blue surface runs along the outer (pial) boundary of the cortex.

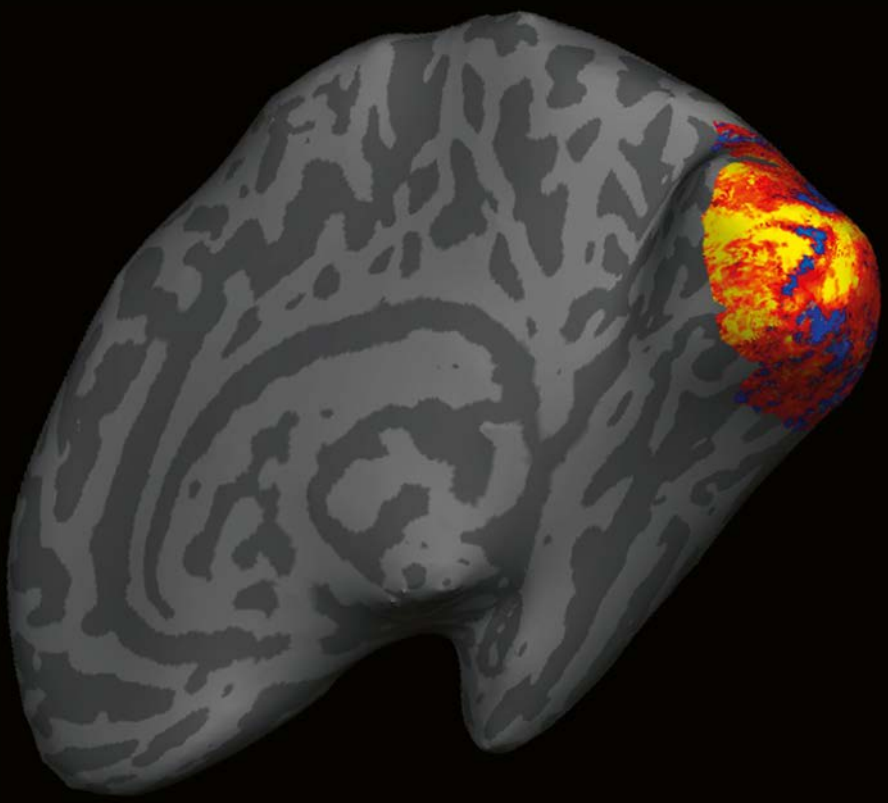
Scannexus, Maastricht, The Netherlands



Tissue segmentation

Delineation of subcortical nuclei in the thalamus and brainstem at 1 mm isotropic resolution. White matter nulled MPRAGE (top TA 8:52 min) and gray matter nulled MPRAGE (bottom TA 10:38 min).

MGH, Boston, USA



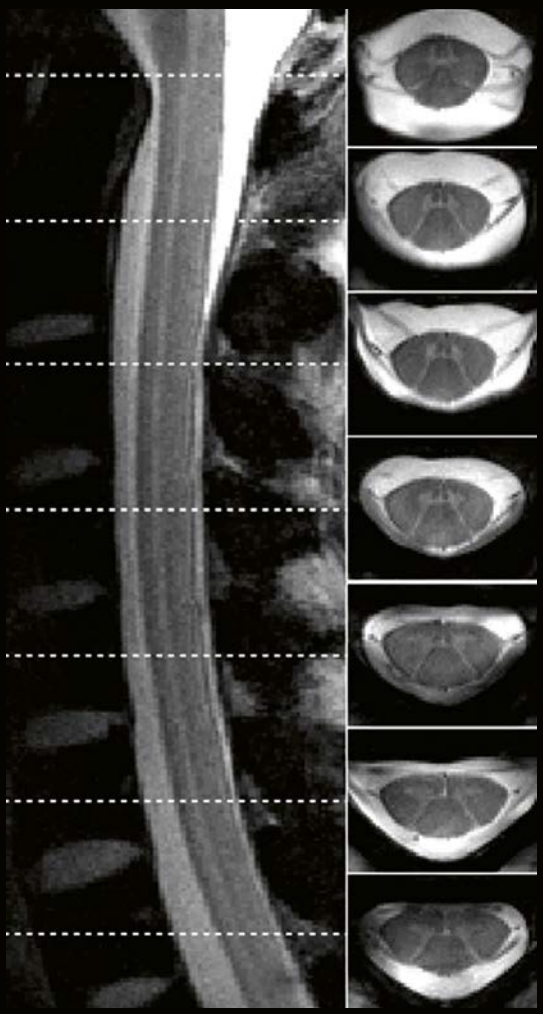
High-resolution fMRI

Cortical-layer-specific activation with fMRI at 1 mm isotropic resolution, inflated view. The fMRI visual stimulus was designed to activate a pattern in the shape of the number "7" using the known retinotopic mapping in the human visual cortex.

MGH, Boston, USA

"Siemens provides the best possible open hardware and software environment to explore these new transmit and receive concepts, all of which have proved essential to allow ultra-high fields to fulfill their potential for the benefit of human health."[13]

Professor Lawrence L. Wald, Director
MGH NMR Core at Martinos Center, Department of Radiology,
Boston, Massachusetts, USA



3 Tesla 0.5 mm in-plane

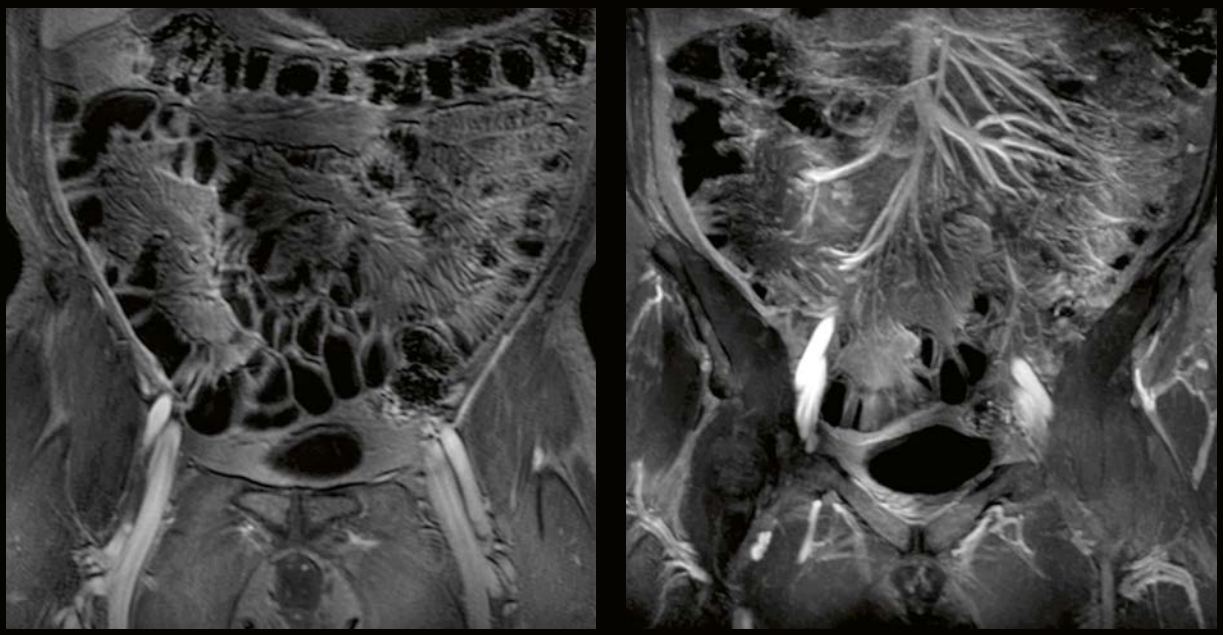
7 Tesla 0.5 mm in-plane

7 Tesla 0.3 mm in-plane

Spine imaging

Ultra-high resolution of the cervical spine using a custom-built spine coil.

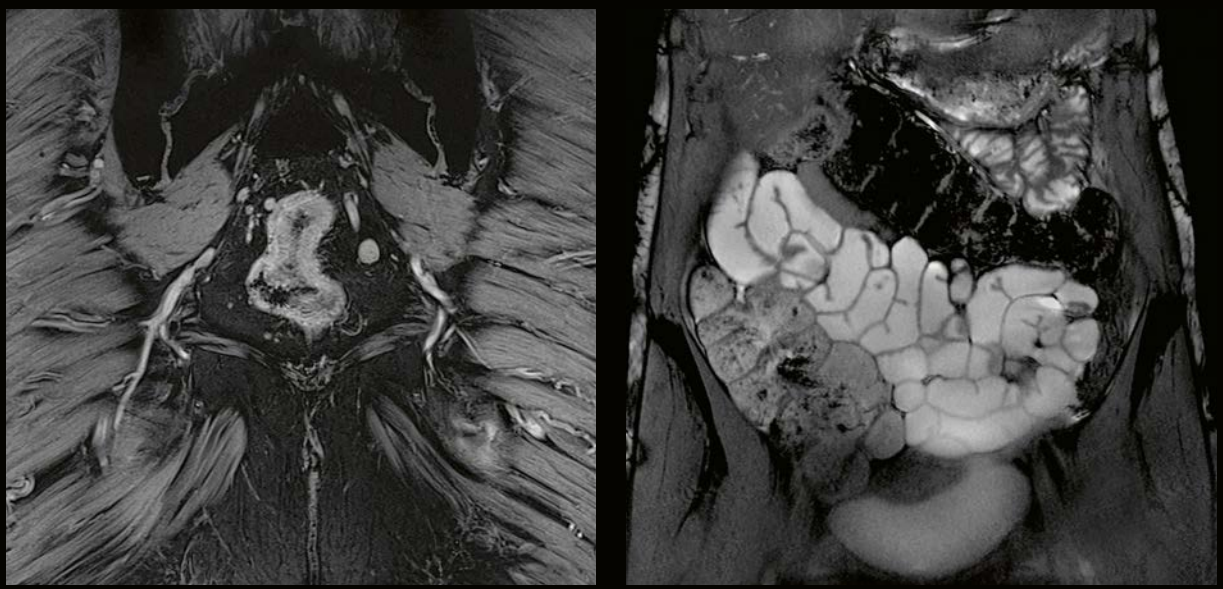
MGH, Boston, USA



Body imaging

Left image, 3D VIBE FatSat, right image, thin MIP from the 3D VIBE FatSat.
Images acquired using pTX and custom-built coils.

Erwin L. Hahn Institute for MRI, Essen, Germany

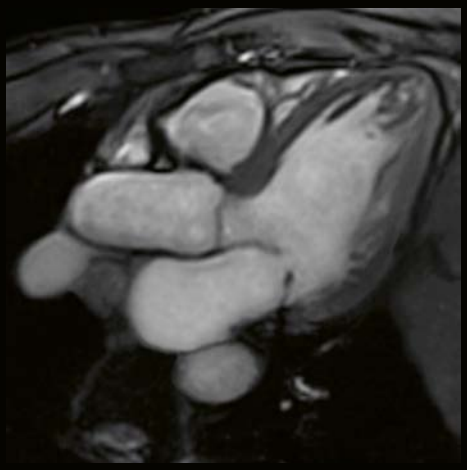


Body imaging

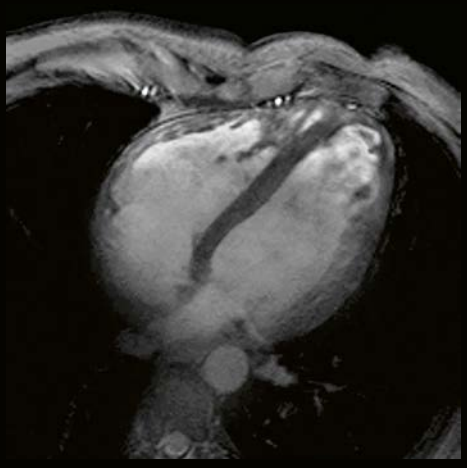
Image left, rectum carcinoma imaged with a ce-FLASH (0.3 x 0.6 x 2 mm^3, TA 2:14 min).
Images acquired using pTX and custom-built coils. Image right, abdominal small bowel imaging with TrueFISP (0.4 x 0.8 x 2 mm^3, TA 26 s).

Erwin L. Hahn Institute for MRI, Essen, Germany

Short axis view FLASH cine retro (1 x 1 x 4 mm^3, GRAPPA 2, TA 18 s).



Right ventricular output tract FLASH cine retro (1.3 x 1 x 4 mm^3, SENSE 2, TA 13 s).



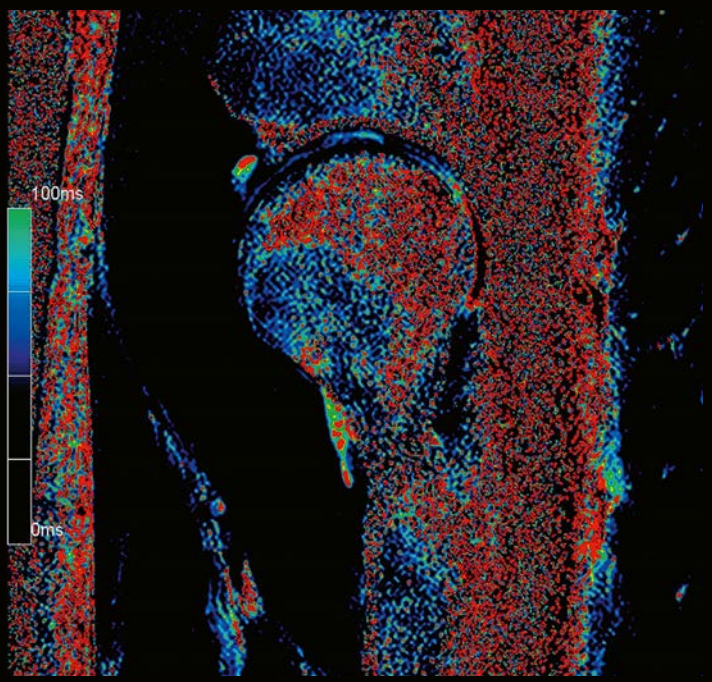
Four chamber view FLASH cine retro (1 x 1 x 4 mm^3, GRAPPA 2, TA 16 s).

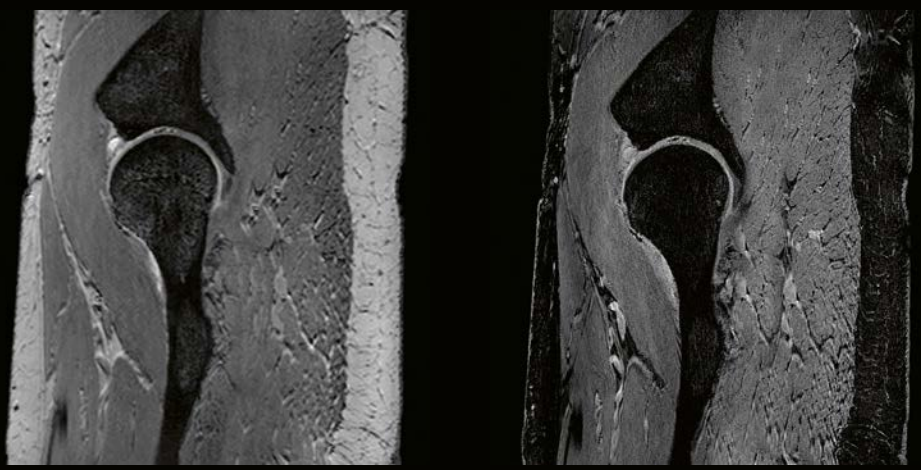
Two chamber view FLASH cine retro (1.2 x 1 x 4 mm^3, SENSE 2, TA 13 s).

Cardiac imaging

Accelerated T1-weighted FLASH acquisitions using a customer-built coil.

Berlin Ultrahigh Field Facility, Berlin, Germany



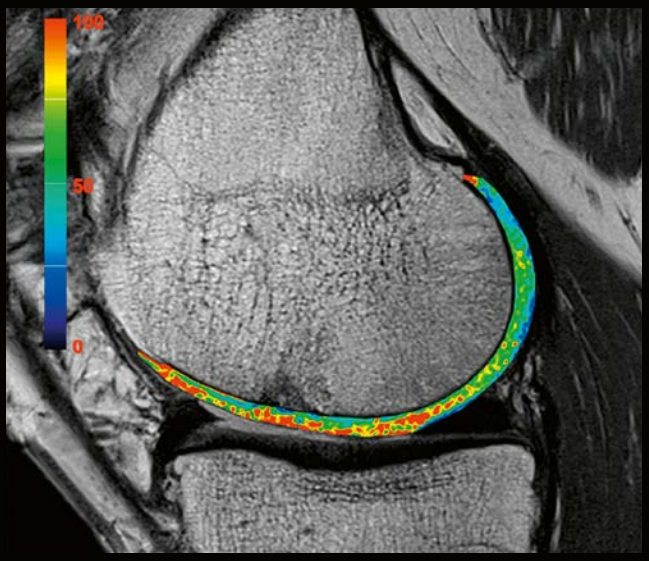


Hip cartilage transplant

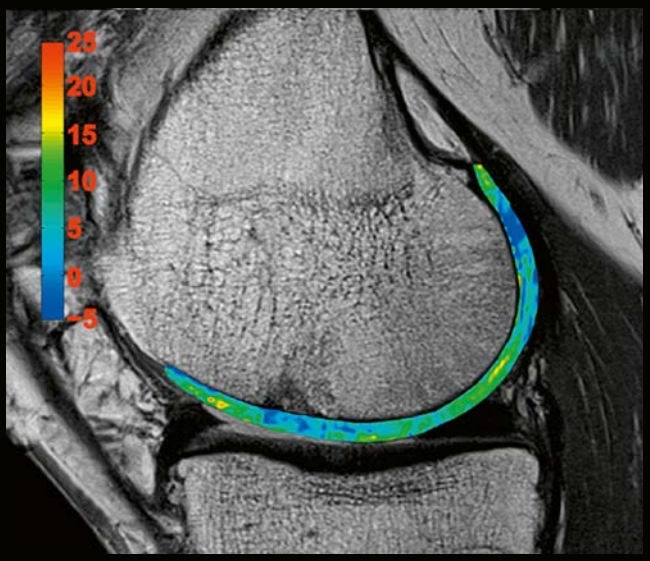
Cartilage transplant visible in 3D DESS (0.37 x 0.74 x 0.74 mm^3, TA 5:11), 3D VIBE SPAIR (0.19 x 0.39 x 0.8 mm^3, TA 5:58) and T2 MapIt (0.25 x 0.5 x 2.5 mm^3, TA 4:47) 14 months after Autologous Chondrocyte Transplantation (ACT) using a customer-built coil.

Erwin L. Hahn Institute for MRI, Essen, Germany

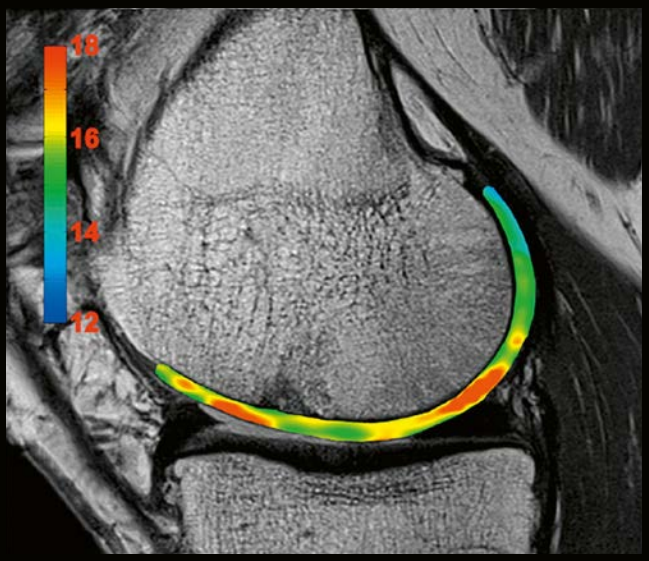
Morphologic PD TSE F(0.4 x 0.4 x 2 mm³)



T2 map (0.6 x 0.6 x 1 mm³), T2 in ms
More water, disturbed collagen architecture visible



gagCEST image (0.7 x 0.7 x 3 mm³)
gagCEST asymmetries in [%] lower values, less PG content

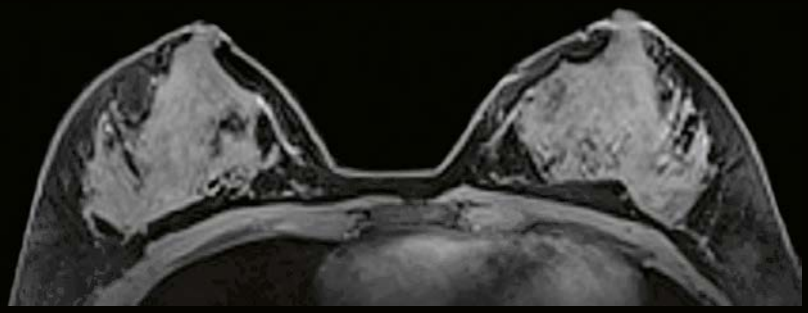


Sodium image
Sodium SNR lower values, less PG content

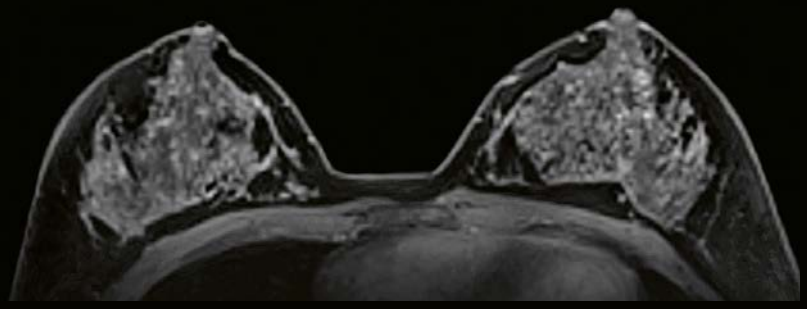
Biochemical imaging using CEST

Male patient nine years after Autologous Osteochondral Transplantation (AOT) in the medial femoral condyle.

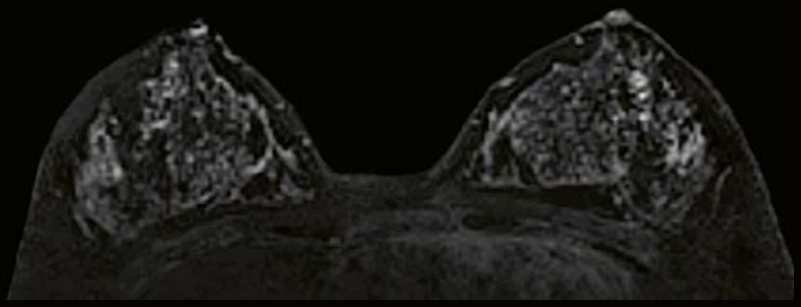
MedUni Wien, Vienna, Austria



Pre-contrast



Post-contrast



Subtraction

Breast imaging

High-resolution bilateral breast imaging in short acquisition time. Pre- and post-contrast 3D FLASH SPAIR, 1.4 mm isotropic resolution, TA 1:48 min/series using a customer-built coil.

NYU Langone Medical Center, New York, USA

Join the largest research community

Your reputation plays a pivotal role in your institution's success. MAGNETOM Terra has the power to let you go deeper than ever before, making your research and patient outcomes stand out from the rest. What's more, this leading-edge technology can help you attract the brightest minds to your facility, further enhancing your capabilities. MAGNETOM Terra has the potential to put your organization firmly on the map, offering access to an exclusive network of expertise and broad scope for collaboration and exchange.

"When we were in a position to order a 7T system, Siemens was the logical choice."[13]

Professor Peter Jezzard
Professor of Neuroimaging,
University of Oxford, Oxford, UK

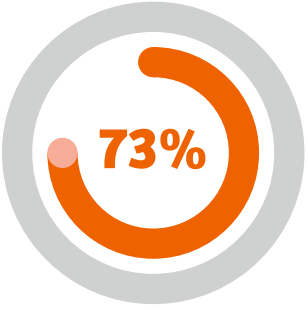
Join the largest research community with over 75% of all UHF users

Enhance your reputation

MAGNETOM Terra helps you achieve your research goals, giving you the opportunity to publish first and become a true opinion leader. This advanced technology has the potential to strengthen your position by attracting the brightest brains to your facility. The scanner lets you deliver previously unseen insights that could improve patient outcomes and further enhance your reputation.

Expand your network

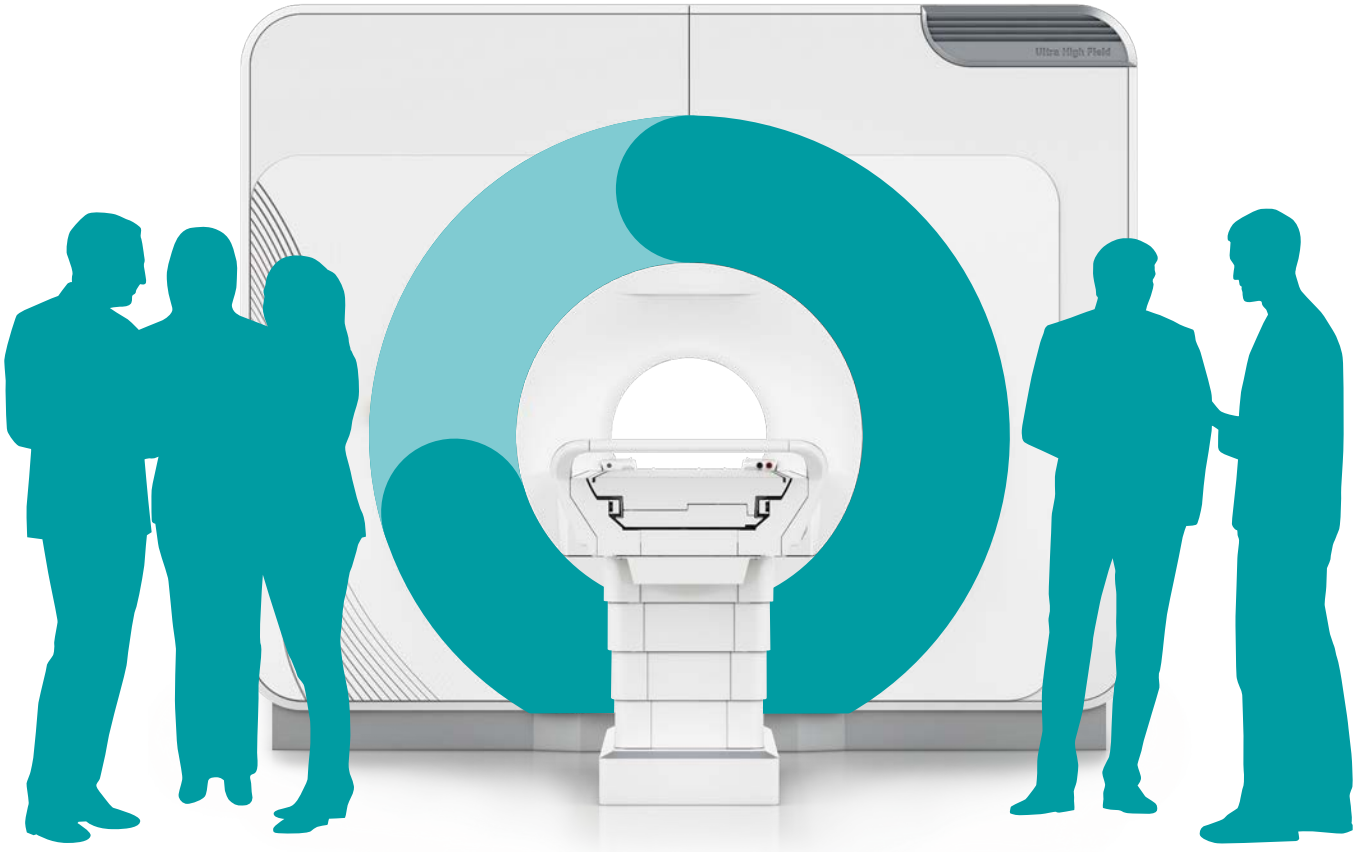
Even if you are taking your first steps in ultra-high-field imaging, you will never be alone. Siemens has proven expertise in UHF MRI and cultivates links with an extensive network of users. As a result, you benefit from the experience of others and can share your own ideas. Siemens is the global leader in 7T – with a market share of over 75% and more than 25 years of experience in this field.



73% of ISMRM UHF abstracts in 2018 were based on data from Siemens UHF systems.[12]

Exchange your ideas with peers

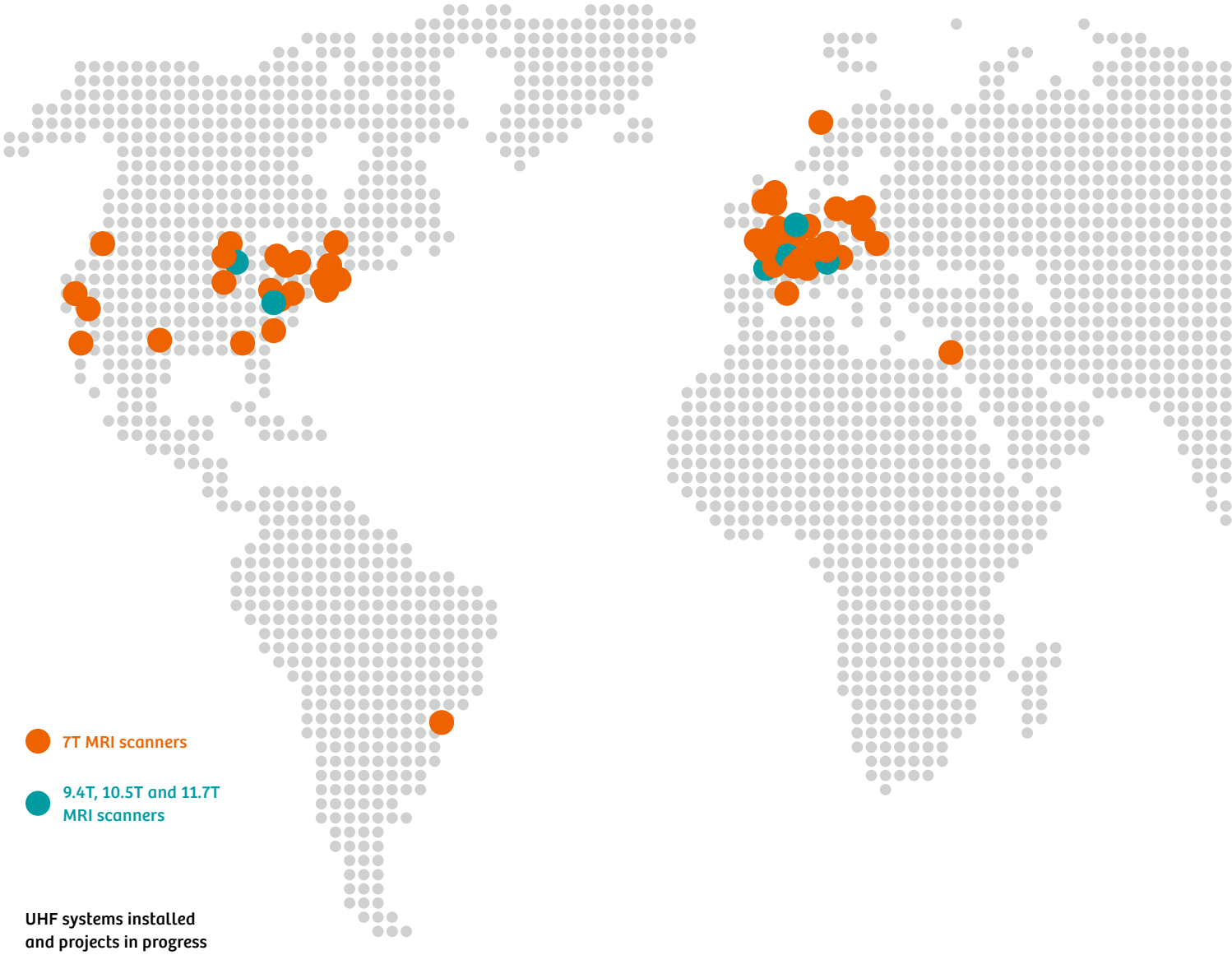
When you become part of the Siemens UHF community, you join an exclusive group of outstanding MRI experts. Through collaboration and exchange with other leaders in your field, you can extend your own knowledge and gain deeper insights. Siemens' regular user meetings and an online discussion board are the ideal platforms to interact with your peers.



Over **75%** of 7T scanners deployed worldwide are from Siemens

Attract and retain the brightest minds and **publish first**

Strong **network** for collaboration and peer-to-peer exchange



UHF systems installed and projects in progress

1 Athinoula A. Martinos Center for Biomedical Imaging of MGH, Boston, Massachusetts, USA

2 Leibniz Institute for Neurobiology (LIN), Magdeburg, Germany

3 Bernard and Irene Schwartz Center for Biomedical Imaging (CBI) of New York University Langone Medical Center, New York City, New York, USA

4 Center for MR Research (CMRR), University of Minnesota, Minneapolis, Minnesota, USA

5 Neuroscience Research Institute (NRI) of Gachon University of Medicine and Science, Incheon, South Korea

6 Advanced Imaging Research Center (AIRC), Oregon Health & Science University, Portland, Oregon, USA

7 Erwin L. Hahn Institute for Magnetic Resonance Imaging (ELH), Essen, Germany

8 Center for Imaging in Biomedicine (CIBM), École polytechnique fédérale de Lausanne (EPFL), Lausanne, Switzerland

9 Max Planck Institute for Biological Cybernetics (MPI KYB), Tübingen, Germany (9.4T)

10 NeuroSpin, French Alternative Energies and Atomic Energy Commission (CEA), Saclay, France

11 NeuroSpin, French Alternative Energies and Atomic Energy Commission (CEA), Saclay, France (11.7T)

12 Magnetic Resonance Research Center (MRRC), University of Pittsburgh Medical Center (UPMC), Pittsburgh, Pennsylvania, USA

13 Max Planck Institute for Human Cognitive and Brain Sciences (MPI), Leipzig, Germany

14 Excellence Center for Highfield MR, Medical University of Vienna (MUW), Vienna, Austria

15 German Cancer Research Center (DKFZ), Heidelberg, Germany

16 Institute of Neuroscience and Medicine (INM), Research Centre Jülich, Jülich, Germany (9.4T)

17 Center For Magnetic Resonance And Optical Imaging (MMRRCC), University of Pennsylvania Health System (HUP), Philadelphia, Pennsylvania, USA

18 Berlin Ultrahigh Field Facility (B.U.F.F.), Experimental and Clinical Research Center (ECRC), Berlin, Germany

19 State Key Laboratory of Brain and Cognitive Science, Institute of Biophysics, Chinese Academy of Sciences (CAS), Beijing, China

20 Oxford Centre for Functional MRI of the Brain (FMRIB), University of Oxford, Oxford, UK

21 Magnetic Resonance Imaging Research Center, Auburn University, Auburn, Alabama, USA

22 Center for MR Research (CMRR), University of Minnesota, Minneapolis, Minnesota, USA

23 Functional MRI Facility (FMRIF), National Institute of Mental Health and Neurological Disorders and Stroke, National Institutes of Health (NIH-NIMH & NINDS), Bethesda, Maryland, USA

24 National Institute of Neurological Disorders and Stroke, National Institutes of Health (NIH-NINDS), Bethesda, Maryland, USA (11.7T)

25 National Institute of Information and Communication Technology (NiCT) / Center for Information and Neural Networks (CiNET), Osaka, Japan

26 Center for MR Research (CMRR), University of Minnesota, Minneapolis, Minnesota, USA (10.5T)

27 Center for Imaging of Neurodegenerative Diseases (CIND), San Francisco VA Medical Center, UCSF, San Francisco, California, USA

28 German Center for Neurodegenerative Diseases (DZNE), Bonn, Germany

29 Biomedical Research Imaging Center (BRIC), University of North Carolina (UNC), Chapel Hill, North Carolina, USA

30 Maastricht Brain Imaging Centre (M-BIC), Maastricht University, Maastricht, The Netherlands

31 Maastricht Brain Imaging Centre (M-BIC), Maastricht University, Maastricht, The Netherlands (9.4T)

32 Mt Sinai School of Medicine, New York City, New York, USA

33 Cleveland Clinic, Cleveland, Ohio, USA

34 Centre for Advanced Imaging, University of Queensland, Brisbane, Queensland, Australia

35 Royal Melbourne Hospital, University of Melbourne, Victoria, Australia

36 University of Sao Paulo (USP), Sao Paulo, Brazil

37 Centre d'Exploration Métabolique par Résonance Magnétique (CEMEREM), Marseille, France

38 Centre for Functional and Metabolic Mapping, Robarts Research Institute, London, Ontario, Canada

39 National Institute for Physiological Sciences (NIPS), Okazaki, Japan

40 Kyoto University, Kyoto, Japan

41 Zhejiang University, Hangzhou, China

42 Brigham and Women's Hospital (BWH), Boston, USA

43 University of Southern California (USC), Los Angeles, California, USA

44 Cardiff University Brain Research Imaging Centre (CUBRIC) Cardiff, UK

45 Wolfson Brain Imaging Centre (WBIC), University of Cambridge, Cambridge, UK

46 Imaging Centre of Excellence (ICE), South Glasgow University Hospital, Glasgow, UK

47 Magnetic Resonance Research Center (MRRC), Yale University, New Haven, Connecticut, USA

48 Comprehensive Heart Failure Center (CHFC), Würzburg University Hospital, Würzburg, Germany

49 Weizmann Institute of Science, Rehovot, Israel

50 Mayo Clinic, Rochester, USA

51 Toronto Western Hospital (TWH), University Health Network (UHN), Toronto, Canada

52 National Institute of Health, National Institute on Drug Abuse (NIH-NIDA), Bethesda, Maryland, USA

53 Forschungszentrum Jülich, Jülich, Germany

54 CRC, University of Liege, Liege, Belgium

55 Houston Methodist, Houston, Texas, US

56 Athinoula A. Martinos Center for Biomedical Imaging of MGH, Boston, Massachusetts, USA

57 University Clinic Erlangen, Erlangen, Germany

58 Montreal Neurological Insitute and Hospital (MNI), McGill University, Montreal, Canada

59 Sungkyunkwan University (SKKU), Seoul, South Korea

60 Balgrist Hospital, Zürich, Switzerland

61 King's College London (KCL), London, UK

62 Barnes-Jewish and Children's Hospital (BJC), St. Louis, Missouri, USA

63 Fudan University, Fudan, China

64 Swiss Institute for Translational and Entrepeneurial Medicine and Inselspital Bern (sitem-insel), Bern, Switzerland

65 University of California Berkeley, Berkeley, California, USA

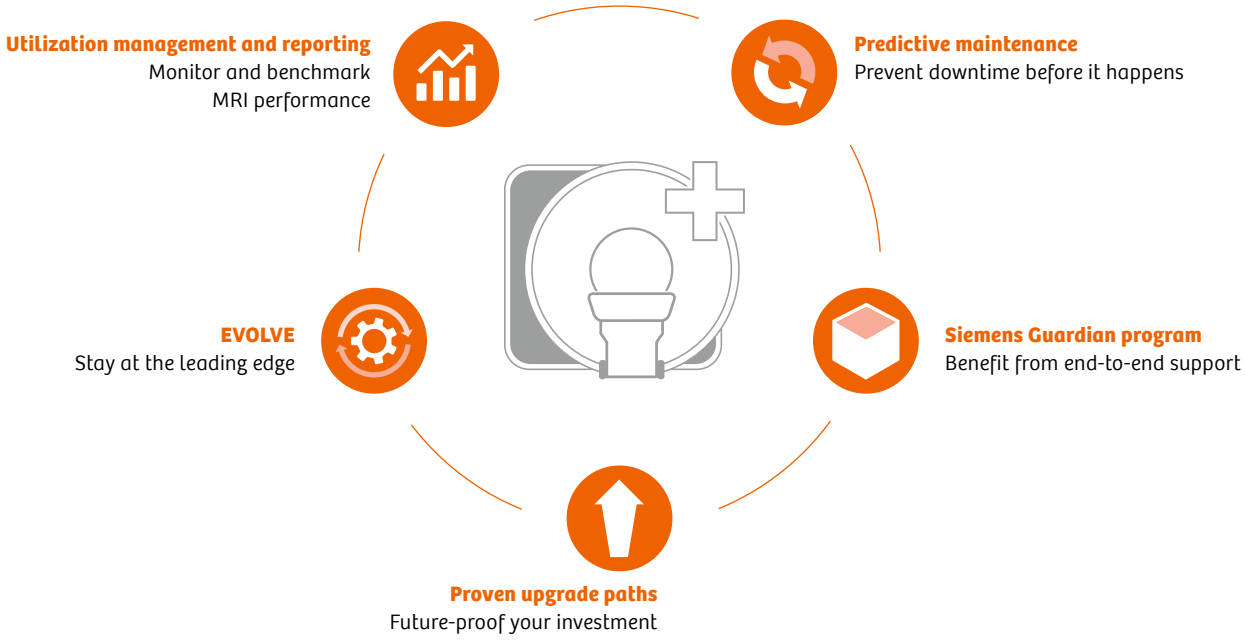
66 Norvegian University of Science and Technology (NTNU), Trondheim, Norway

67 Welcome Centre for Human Neuroimaging, University College London, UK

68 Centre Hospitalier Universitaire de Poitiers (CHU), Poitiers, France

69 Zhongnan University Xiangya Hospital, Hunan, China

Service and exchange – Comprehensive services



Siemens' end-to-end services ensure you stay at the leading edge of MRI technology throughout the entire system lifecycle – from installation, to operation, to upgrades, to ongoing support. Moreover, our diverse communication platforms and communities keep you up to speed on the world of MRI and enable you to share your ideas and experiences with your peers.

Utilization management and reporting
This powerful solution gives you more from your MRI scanner. It allows you to monitor KPIs and benchmark your system against other Siemens MRI machines at any facility or organization. So you can keep track of your MRI performance, and reap the maximum reward from your scanner.

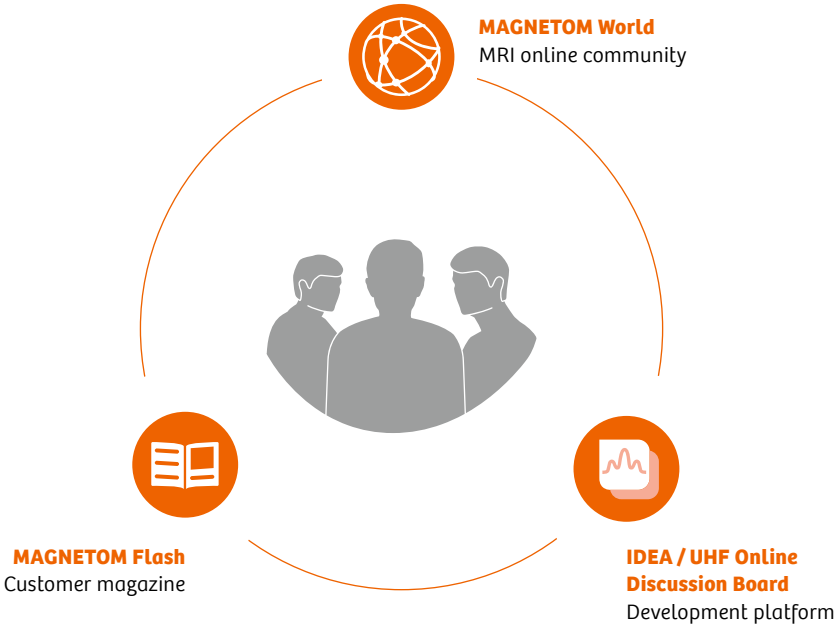
Predictive maintenance
When systems go down, it impacts both your ability to care for your patients and your bottom line. Siemens provides a predictive maintenance service to help you minimize lost time. It informs you when a part of your MRI system is likely to fail, enabling you to plan repairs and prevent downtime before it happens.

EVOLVE
Keep your hardware and software up to date at all times – a key factor in enhancing performance and diagnostic quality. You receive all applicable upgrades for software and the *syngo* OS, plus at least one workstation hardware upgrade within the first six years.

Siemens Guardian program
This program provides the latest service technology so you can better manage your MRI system. It combines many features in a single package – offering real-time system monitoring, expert advice to improve workflow efficiency, proactive maintenance, and support. Moreover, it guarantees defined repair times, giving you complete peace of mind.

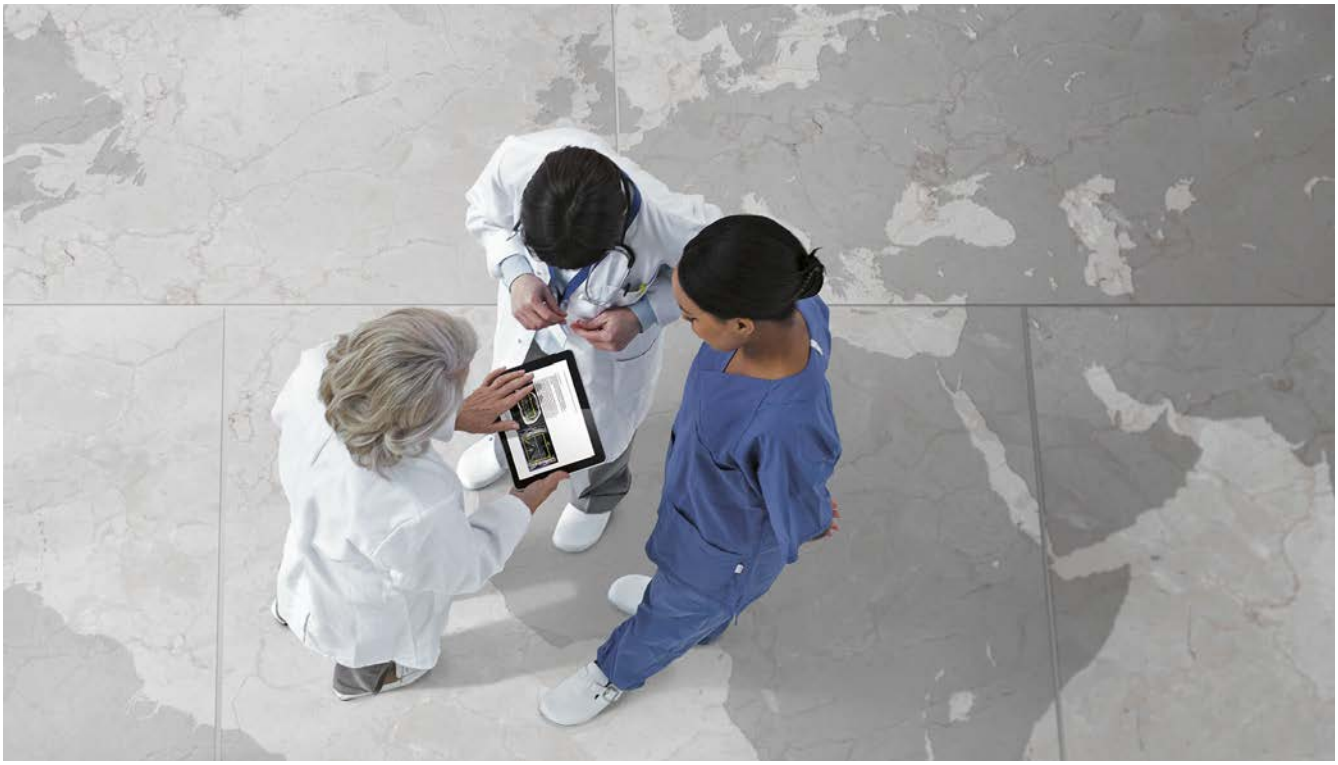
Proven upgrade paths
With MAGNETOM scanners, taking your MRI system to the next level is simplicity itself, thanks to clearly defined upgrade paths. In fact, Siemens has built an entire organization (CDV) to help customers truly maximize their system life – and increase their return on investment.

Service and exchange – Peer-to-peer information



On MAGNETOM Flash:
"An excellent and useful combination of technological and clinical articles that both keep one up to date with advances in MRI and provide practical assistance for day-to-day practice – good and interesting learning material."[13]

Mark Lourensz
St Vincent's Hospital, Fitzroy, Victoria, Australia



MAGNETOM World
Siemens Healthineers' global MRI community offers peer-to-peer support and information. Radiologists, cardiologists, technologists, and physicists have all contributed with publications, presentations, training documents, case studies, and more – all freely available to you via this unique network. Plus, the bi-annual MAGNETOM World Summit is the ideal opportunity to share and exchange ideas.

MAGNETOM Flash
Published quarterly, the MR customer magazine features up-to-date clinical case studies, application tips and technical and product information relevant to you. All content is carefully compiled by experts to meet the needs of today's MRI users in both clinical and research scenarios. In fact, 98.5% of readers report that MAGNETOM Flash is clinically relevant.

IDEA / UHF Online Discussion Board
IDEA[8] is an open development platform for the largest and most active 3T and UHF research communities in the world. It unites users from across the globe and fosters innovation in the field of MRI. Members collaborate online at www.mr-idea.com and at an annual meeting. IDEA includes an exclusive area, the UHF Online Discussion Board, to help users focus on topics of interest, as well as find and communicate with the right peers.

Visit MAGNETOM World

siemens.com/magnetom-world

Technical specifications

MAGNETOM Terra **Technical specifications**	
Field strength	7 Tesla
Bore size	60 cm
Magnet length	270 cm
System length	297 cm
System weight (in operation)	< 25 tons
Minimum room size[17]	65 m^2 / (w/o pTX^2 and 3rd order shim option)
Dual Mode functionality[2]	Clinical Mode Research Mode[2]
RF transmit	TimTx-1, TimTx-8, TimTx-16 (in research mode)[2]
Maximum number of channels[3]	32, 64
Number of independent receiver channels that can be used simultaneously in one single scan and in one single FOV, each generating an independent partial image	32, 64
Gradient strength	XR gradients (80 mT/m @ 200 T/m/s)
Helium consumption	Zero Helium boil-off technology
Quiet Suite/DotGO	Available in research mode[2]
Local coils in clinical mode	1TX/32RX head coil 1TX/28RX knee coil 23Na 1Tx/32Rx head coil 31P/1H TxRx flex loop coil


Ultra High Field
SIEMENS
Healthineers
MAGNETOM Terra

Why Siemens Healthineers?

At Siemens Healthineers, our purpose is to enable healthcare providers to increase value by empowering them on their journey towards expanding precision medicine, transforming care delivery, and improving patient experience, all enabled by digitalizing healthcare.

An estimated 5 million patients globally everyday benefit from our innovative technologies and services in the areas of diagnostic and therapeutic imaging, laboratory diagnostics and molecular medicine, as well as digital health and enterprise services[18].

We are a leading medical technology company with over 170 years of experience and 18,000 patents globally. With more than 48,000 dedicated colleagues in 75 countries, we will continue to innovate and shape the future of healthcare.

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1 Compared to 3T systems.

2 Research mode as part of dual mode is available as an option and not intended for clinical use. Research operation may require observation of national regulations.

3 Channels (coil elements) that can be connected simultaneously.

4 Keil et al., Magn Reson Med 70:248–258 (2013); Wiesinger et al., Magn Res Med 52:953–964 (2004); Pruessmann et al., Magn Reson Med 42:952–962 (1999); Griswold et al., Magn Reson Med 47:1202–1210 (2002)

5 Compared to previous 7T generation.

6 Under normal operating conditions with standard Siemens sequences/protocols.

7 Example images available in this Brochure: Page12; SWI minIP/phase, Page 13; T2 TSE, SWI, Page 15, Page 16; PD FSE TSE, Page 17; SWI, T2 TSE, Page 22 ; SWI, Page 23 ; PD TSE FS, Page 24; T1 SE, Page 25 ; PD qTSE FS.

8 Scheenen et al., Magn Reson Mater Phy 21:95–101 (2008)

9 Heidemann et al., Magn Reson Med 68:1506-1516 (2012); Yacoub et al., PNAS 105:10607-10612 (2008)

10 Madelin et al., J Magn Reson Imaging 38:511-529 (2013); Valkovic et al., Analytical Biochemistry 529:193-215 (2017)

11 https://health.usnews.com/best-hospitals

12 https://www.ismrm.org/18m

13 The statements by Siemens' customers described herein are based on results that were achieved in the customer's unique setting. Since there is no "typical" hospital and many variables exist (e.g., hospital size, case mix, level of IT adoption) there can be no guarantee that other customers will achieve the same results.

14 Trattnig, et al., NMR Biomed. 9:1316-1334 (2015)

15 Cinematic VRT is recommended for communication, education, and publication purposes and not intended for diagnostic reading.

16 Rendered with a Siemens internal cinematic rendering prototype.

17 Minimum total space requirement for magnet, electronics, and console room.

18 Siemens AG, "Sustainable healthcare strategy – Indicators in fiscal 2014", pages 3–4.

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